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A traffic history of the
Mississippi River System.

by
Frank Haigh Dixon



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A TRAFFIC HISTORY
OF THE
MISSISSIPPI RIVER SYSTEM

BY

FRANK HAIGH DIXON

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

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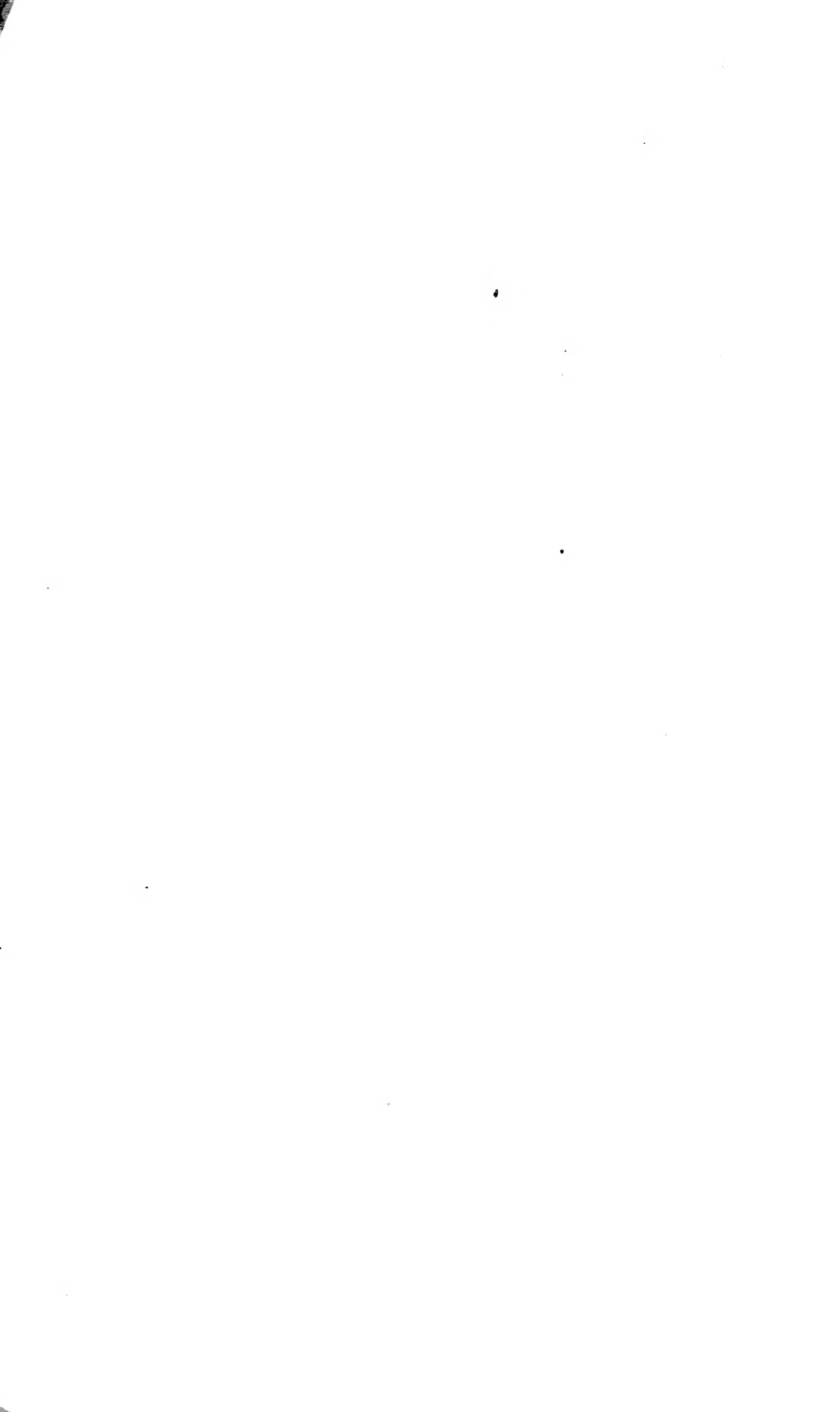
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SOURCES OF INFORMATION.

Traffic statistics of the waterways of the United States, particularly of the river systems, have been very unsatisfactory, and in spite of the care now taken to obtain information from the most reliable sources, they can be regarded even at present as only approximately correct. This is due to the fact that the United States Government has never assumed control of waterway traffic as it has of that of railways and hence has never requested from water carriers any statistical reports.

Such statistics as have been collected largely come from two sources: First, the organized commercial bodies of the larger cities, and, second, the reports of the Corps of United States Engineers, who, in their investigations and construction work upon the waterways, have collected under instructions such commercial statistics as were available and as were likely to assist the authorities in judging the probable commercial value of any engineering project. The United States engineers have in most cases collected their own information, but in some instances they have taken their facts second-hand from the commercial organizations, so that this voluntary machinery is frequently almost our only source of information. That the information secured in this way is far from satisfactory must be apparent at once. In the first place, many of the chambers of commerce have had no systematic plan for the preservation of records; some have lost their records by fire, others by the ravages of war. The annual reports of only one river city—Cincinnati—have been available previous to 1860 and these reports could be secured only as far back as 1848. Whatever of information, therefore, is desired from these sources must be obtained from such reprints as have been made by the commercial journals of the time or by the reports of the United States engineers. Moreover, such information as is available is almost useless because it lacks uniformity, is local in its outlook, and is presented in such haphazard fashion that no comprehensive picture of river commerce for any one year can be obtained by any combination of the local figures. Of more serious importance, however, is the fact that the statistics are probably in no case complete. If a boat captain, after securing a full load, chose to leave the dock without submitting a record of his cargo to the harbor master, there was no power that could prevent, and complaints of this character were frequent. Again there was no compulsory system of waybills or records of any sort, and products were frequently taken from port to port with no more formality than the transfer of the freight money to the purser's pocket. No reliance should be placed, therefore, upon the statistics of traffic presented in this discussion as a picture of the actual business of any particular year. However, it is fair to assume that they are of some value

when looked at comparatively. It is probable that the statistics of one year were taken in about the same manner as those of another. Hence, however inadequate the information may otherwise be, we may fairly draw conclusions as to the increase or decrease of traffic over a period of years.

Aside from occasional special studies which bear either directly or indirectly upon the subject under consideration, most of the information here given for the period previous to 1860 is derived from congressional documents, including special reports of government officials, or congressional committees, the annual reports of the Chief of Engineers, United States Army, and from current publications, such as Niles' Register and Hunt's Merchants' Magazine. Reference should also be made to the careful and detailed history of Mississippi River commerce in the Report on Internal Commerce of the United States for 1887.

For the period after 1860, the authorities already quoted have been drawn upon. In addition to these sources, annual reports of the chambers of commerce and similar commercial organizations of the principal river cities have been available, including the reports of commercial bodies in Cincinnati, Pittsburg, Louisville, Kansas City, New Orleans, St. Paul, and St. Louis. In addition there are the official publications of the United States Government, which have been very much more satisfactory in recent years, some of which have devoted considerable attention to water traffic.

The collection of statistics of traffic on internal waterways, so far as it was authorized by congressional statute, began with the river and harbor bills of 1866 and 1867, which required the Secretary of War to report on various works and to state the amount of commerce and navigation which would be benefited by the expenditures. This legalized a long-standing practice under which the Corps of Engineers reported the commercial statistics in the manner already described. On May 3, 1875, an act was passed which provided for an annual report by the Bureau of Statistics of "the actual cost of transporting freight and passengers on the railroads and on the canals, rivers, and other navigable waters of the United States, the charges imposed for such transportation of freight and passengers, and the tonnage transported." A Bureau of Internal Commerce was set up in the Treasury Department and the first report was issued in 1876 as Part II of the Annual Report on Commerce and Navigation.^a

These reports continued to be issued with some irregularity until the inauguration of the Monthly Summary of Commerce and Finance, in 1901, which devotes a section to internal commerce. The statistics for the river systems as they appear in this summary are in most cases drawn from the monthly reports of the United States engineers, the latter being assisted in the collection of information by an act of Congress of February 21, 1891, which requires agents of all vessels navigating waterways under federal improvement to furnish statements of their vessel cargoes to the United States engineer officer in local charge of such improvements.

^a The report entitled "Commerce and Navigation," devoted solely to foreign commerce, had been issued annually since 1822.

Other official publications of value which cover the period of the last twenty years include the volume on Transportation by Water, in the Census of 1890, and the Special Census Report on Transportation by Water in 1906, and the Preliminary Report of the Inland Waterways Commission, 1908, containing much information collected by the Bureau of Corporations. This material is now being published by the Bureau of Corporations in more extended form in a series of volumes. The first two parts have appeared, and discuss General Conditions of Transportation by Water (pt. 1) and Water-borne Traffic (pt. 2). All of these publications have been freely drawn upon in the preparation of this study.

DEVELOPMENT OF TRANSPORTATION ON THE MISSISSIPPI RIVER SYSTEM PREVIOUS TO 1860.

I.

BEFORE THE TIME OF STEAM.

In tracing the traffic history of the waterway system of the Middle West it is unnecessary to give more than passing attention to the period preceding the nineteenth century. The development of our internal resources hardly took its beginning until the close of the French and Indian war, in 1763, when Kentucky and Tennessee received their first settlers. During the Revolution a considerable trade sprang up between the Ohio River settlements on the one hand and New Orleans and the eastern seaboard on the other, the shipments of the middle western producers being down the Ohio and the Mississippi, but this was suddenly cut off with the enforcement by Spain of her commercial restrictions on the lower Mississippi after 1785. Not until the purchase of Louisiana in 1803, or even until after the war of 1812, was the Mississippi sufficiently free from obstructions or the traders sufficiently protected from annoyance and risk to permit the development of a steady and reliable traffic. The eighteenth century was to a considerable degree a time of exploration and discovery, of pioneering and adventure, and not a period of settled commerce. To be sure, commerce of a primitive kind was continuously present upon these interior waters, but it was only such commerce as exists wherever human beings who have things to exchange come into contact with one another.

The dates of admission to the Union of the first river States indicate, in a general way, the rapidity of settlement and the growth of a basis for commercial activity. The dates are as follows:

Kentucky.....	1792
Tennessee.....	1796
Ohio.....	1802
Louisiana.....	1812
Indiana.....	1816
Mississippi.....	1817
Illinois.....	1818
Missouri.....	1821

In 1810 about one million people were living in the western States and Territories. This number had more than doubled by 1820. The period of economic depression after the Revolution, the Peace of Amiens, which gave a sudden pause to the prosperity of our foreign carrying trade, the embargo, and the War of 1812, all served as spurs to drive the people westward into the new lands along the waterways.

As prosperity increased and the settlers began to have surplus products for sale, the need for efficient transportation facilities upon

the rivers became increasingly urgent. Devices of all sorts had been resorted to, many of them borrowed from the Indians and pioneers. The canoe, often large and capable of carrying much freight, was one of the earliest means of transportation. With this went the pirogue, a boat hollowed out of a log and propelled by oars or setting poles. The freight carriers were, at the beginning, either the batteau or the barge. The former was made of rough plank and was capable of carrying heavier loads than the pirogue. The latter was one of the great burden bearers on the Ohio and Mississippi in the early days. The barge, carrying 40 or 50 to 100 tons, descended with the current and was worked upstream by any one of a number of devices, which included sail, oars, poles, "cordelles" (ropes by which craft were towed from the shore), warping, animal towage, and "bush-whacking" (hauling upon the overhanging branches along the banks).

Audubon, who took a trip up the Mississippi and Ohio in these days,^a states that a barge would leave New Orleans on March 1 and frequently would not reach the falls of the Ohio at Louisville until July, and then it brought only a few barrels of coffee or, at most, 100 hogsheads of sugar. The number of barges in 1808 did not amount to more than 25 or 30 and the largest did not exceed 100 tons burden. These barges made one round trip a year or sometimes two under unusually favorable circumstances. The trip downstream from Pittsburg to New Orleans took about a month. It was the wearisome trip back which consumed the time. In a favorable stage of water, goods could be sent without break of bulk from New Orleans to Cincinnati; but if the water was low, transshipment at the falls of the Ohio at Louisville was necessary.

The keel boat, a long, narrow craft averaging 12 to 15 feet by 50, with both ends pointed, ran with the current and was poled upstream. This craft carried 20 to 40 tons. There were probably not over 300 to 400 of these boats regularly plying the Ohio in 1810. It is estimated that 150 of them made three voyages per season between Pittsburg and Louisville. Their peculiar advantage was in their narrow build, which permitted them to ascend the tributaries of the main rivers for long distances and to provide the necessary means of communication for the settlers of the interior. They distributed necessities, such as salt and flour, and did the carrying trade of the portages. As their operators acquired knowledge of the danger points in the streams, their prestige grew and their patronage developed.

This form of craft was adapted for passenger travel by providing it with a covered deck. A regular packet service ran between Pittsburg and Cincinnati even before the beginning of the nineteenth century. From an advertisement of the first packet line, established in 1794, the following is taken:^b

First boat will leave Cincinnati this morning at 8 o'clock and return to Cincinnati so as to be ready to sail again in four weeks from this date. No danger need be apprehended from the enemy as every person on board will be under cover made proof to rifle balls, and convenient pertholes for firing out. Each of the boats is armed with six pieces, carrying a pound ball; also, a good number of muskets, and amply supplied with ammunition, strongly manned with choice men, and the master of approved knowledge.

^a Hulbert, *Historic Highways*, vol. 9, pp. 113-118.

^b Ringwalt, *Transportation Systems in the United States*, p. 44.

The craft most extensively employed in early transportation, both by pioneers and regular traders, was the flatboat. This was the boat which never came back. Constructed rudely and cheaply, costing only from \$20 to \$50, it was used for downstream traffic along the banks of the Ohio and Mississippi. It was about 40 feet long, built square, and managed by oars. At the end of the journey in New Orleans it was sold for lumber and its former owner made his dangerous way back to the upper Ohio as best he could. The risks of the trip doubtless led many to undertake it purely in the spirit of adventure, yet much regular trading was carried on by this means.

Similar in character to the flatboat was the ark, employed for passenger travel, and the principal reliance of the emigrant.

In any complete description of early river craft it is necessary to include sailing vessels, which were built in the Ohio Valley during the last decade of the eighteenth century, and grew in importance. They were exclusively downstream craft, and were the export carriers for these sections, being constructed with a view to through journeys to the Atlantic coast or the neighboring islands. These ships were sometimes built of a capacity as great as 400 tons. They could, however, never attain any permanent place in the commerce of this section, because they were one-way carriers only, because the narrowness of the rivers restricted their necessary freedom of movement, and because the irregularity of water supply and the dangers of navigation made boats of deep draft impracticable.

The difficulties of navigation at that time can hardly be overestimated. Aside from the risks of hostile attack and the difficulties of upstream propulsion, and aside also from the dangers of snags and bars which have attended the later history of river navigation also, there were the difficulties of guiding the rude and unwieldy craft around the many islands and the numerous sharp bends, particularly in the upper Ohio.

From February to June and from October to December were the best seasons for the navigation of the Ohio, although in the former season on the floating ice often made the trip dangerous. Head winds were another frequent source of trouble. The river was so crooked that a favorable wind might within an hour become an unfavorable one, and these contrary winds contending with a strong current were not unlikely to drive the boat ashore. Boats sometimes passed from Pittsburg to the mouth of the Ohio in fifteen days and usually ten of these days were used in reaching the falls at Louisville. However, it was not unusual for a boat to be two weeks in reaching even Limestone, Ky.^a

After the falls of the Ohio were passed, and this could be successfully accomplished only in high water, navigation was good for keel boats and barges of 100 to 200 tons.

The commerce floated upon the lower Mississippi and the Ohio in these first decades of the nineteenth century was of various origins. Besides that which came from settlements along the river banks, much traffic came down the tributary streams to be collected and transported on the main river systems. Manufactured articles and luxuries from the Atlantic seaboard destined for New Orleans and up-river points came to Pittsburg across the mountains, or to New

^a Gephart, *Transportation and Industrial Development in the Middle West*, pp. 62-63.

Orleans by coasting vessel and then upstream by barge. The principal upstream traffic of the barges consisted of sugar and molasses, although groceries and other articles needed in the Northwest Territory were transported by this means. Downstream trade was largely in flour and whisky, but a more miscellaneous traffic was also common. Niles's Register of March 29, 1817, announces the arrival in New Orleans within the year of 529 flat-bottomed boats and 300 barges from the Western States and Territories, bringing a large variety of food products and household necessities. This traffic was independent of the boats from lower Louisiana bringing cattle, corn, indigo, molasses, sugar, timber, and the like, and was also exclusive of the peddling traffic of those flatboats which disposed of their cargoes at plantations along the river banks before arriving at New Orleans.

Very little information is available concerning the cost of transportation during these early years. Ringwalt states that the charge between New Orleans and Cincinnati was about \$5 to \$6 per 100 pounds, or at the rate of about 7 cents per ton per mile, which was much below the average charge for haulage across the mountains from the east.^a This statement is in practical agreement with that of Robert Fulton, who, in an argument for the building of Erie Canal in 1814, stated that the freight on a barrel of flour from New Orleans to Louisville was \$4.50 per 100 pounds, or \$9 per barrel, equivalent to 6.7 cents per ton-mile. This he contrasted with the downstream rate of \$1.50 per barrel, or a little over 1 cent per ton-mile, the lower downstream rate being due to the greater ease of navigation and the larger supply of craft.

II.

THE STEAMBOAT AND ITS COMPETITORS.

The application of steam to interior river navigation began with the descent of the Ohio and the Mississippi by the steamboat *Enterprise*, later called the *New Orleans*, which left Pittsburg in September, 1811, and reached New Orleans in January, 1812, stopping on the way to receive congratulations and once retracing its path upstream for the purpose of demonstrating to an incredulous public its power to accomplish the feat. But it was long before the steamboat was to drive the less efficient craft from the rivers. In the first place, much experimenting was required before a boat could be built that was adapted to cope with the dangers of this unique navigation. Boats were at first built on the ship model with deep holds, and with too great draft for the shoal sections of the rivers. Not until the peculiar river type had been evolved—broad and flat, capable of carrying 1,000 tons when drawing only 4 feet of water, and with draft of only 2½ feet when empty—could the speed and the power be secured to overcome the many obstacles which the rivers offered.

A second hindrance to rapid steamboat development was the falls of the Ohio which, except in times of high water, divided the stretch between Pittsburg and New Orleans into two sections. Inasmuch as boat building was largely confined at the beginning to the upper Ohio and its affluents, where wood was abundant and the fitting out of steamboats could be more readily accomplished, steamboat commerce was slow of growth, because of the lack of a basis for rapid traffic development in the sparse settlements along the upper Ohio.

^a Development of Transportation Systems in the United States, p. 47.

A third hindrance was found in the monopoly granted to Fulton and Livingston for the exclusive operation of steamboats upon the Mississippi for fourteen years within the limits of the State of Louisiana. If steamboats could not reach with their product the goal of river traffic, New Orleans, without paying heavy royalty, there was little to be gained from the operation of the Mississippi or of the Ohio below the falls. This monopoly was weakened in 1818, virtually abandoned in 1820, and given its official death blow by the decision of the Supreme Court in 1824 in the case of *Gibbons v. Ogden*, which destroyed the monopoly in interstate commerce of the same individuals on the waters of the Hudson.

It is not surprising, therefore, that the number of flat and keel boats and barges steadily increased during this period of steamboat beginnings. The country was settling rapidly, traffic was growing, the flatboats could carry heavier loads than the first steamboats, their operators were experienced pilots, who had acquired custom and good will, and though slow moving, they ranged farther in these early days than their steam-propelled competitors.

Many steamboat trips both up and down stream were made during the years immediately succeeding 1811, but students of transportation are agreed in setting the year 1817 as the one in which steamboat navigation passed from the experimental stage into a regular service. In that year the steamboat *Washington* made a trip from Louisville to New Orleans and return in forty-one days, the voyage upstream consuming twenty-five days. This trip dispelled the last of the remaining doubts and people from this time on accepted the steamboat as a necessary and normal factor in their economic life.

Steam navigation, while bringing about its results only gradually, had the effect of developing trade and, with the disappearance of monopoly, of lowering rates. The rates and fares prescribed by the State of Louisiana with the grant of monopoly to Fulton and Livingston remained in force until about 1819, when competition drove them down. As typical of these rates the following are given: From New Orleans to Louisville, $4\frac{1}{2}$ cents per pound for heavy goods, and 6 cents for light goods, an average of about 5 cents per pound, or \$100 per ton, equal to 7.5 cents per ton-mile. The passenger fare from New Orleans to Louisville was \$125, or 9.4 cents per mile. The rates were cut in two on downstream traffic. The high passenger fare is partly accounted for by the fact that it included board on the trip. If twenty-five days be allowed for the uptrip and board be charged at \$2 per day, the fare per mile is reduced to 5.6 cents. But no such deduction can be made in the case of freight where the charges seem to have been during the monopolistic period up to 1820, practically the same as before the appearance of steamboats. But it should be remembered that steamboats carried almost no freight until 1819, and that for many years thereafter they met the competition of the more primitive craft.

The flatboats not only persisted but they increased in numbers and capacity. They finally reached a size of 150 feet by 24 feet, carrying 300 tons of produce. Their traffic grew and flourished until the civil war practically put an end to it. Levi Woodbury, who took a trip down the Ohio and Mississippi in 1833, thus describes this form of trading:

At every village we find from 10 to 20 flat-bottomed boats which, besides corn in the ear, pork, bacon, flour, whisky, cattle, and fowls, have an assortment of notions

from Cincinnati and elsewhere. Among these are corn brooms, cabinet furniture, cider, apples, plows, cordage, etc. They remain in one place until all is sold out, if the demand be brisk; if not, they move to another town. After all is sold out, they dispose of their boat and return with their crews by the steamers to their homes.

During these years the flats bore their cargoes to southern ports or to be retailed along the plantations of the Mississippi. Any enterprising man who could build a "flat" bought up the crops of the neighborhood, put them aboard and was ready to start on the "fall rise." Apples and potatoes were the staple through freight. Goods for peddling included cider, cheese, pork, bacon, cabbages, and apple and peach brandy. The development of the hay traffic from Indiana to New Orleans in the twenties opened a new field of usefulness for them. They seemed peculiarly adapted to the collection of produce on streams hardly navigable, such as the Wabash. During all this period the downstream traffic was the heavier, the upstream traffic consisting principally of coffee and sugar among the tropical products, and of manufactured goods and luxuries from the Atlantic seaboard and foreign ports.

Because the traffic was predominantly downstream and because the light traffic upstream could be taken care of by the steamboats, the keel boat found its usefulness at an end and rapidly disappeared. The flatboats, on the other hand, admirably supplemented the steamboats by carrying downstream the produce which the steamboats were not able to handle, by navigating streams where the risks of snags and bars were too great for the more valuable vessel, and where the settlements were sparse and the business light, and by converting themselves into lumber at New Orleans and thus removing themselves from the field of competition for the meager upstream traffic. As late as 1840 nearly a fifth of the freight handled on the lower Mississippi went by flatboat, keel, or barge, principally by flatboat. Steam towing of flatboats was tried as early as 1829, but was not successful, owing apparently to the lack of proper organization and to the prejudices of the flatboat owners.

The published statistics of flatboat arrivals at New Orleans are very incomplete. The craft was so informal in its movements that its arrivals and departures could not readily be registered. It should be noted, however, that two-thirds of the annual arrivals took place in January and February. It is estimated that in the decade 1820-1830, 3,000 flatboats annually descended the Ohio.

The following table presents the most satisfactory statistics available of flatboat arrivals at New Orleans for a series of years:

Arrivals of flatboats at New Orleans.

1845-46	2,763
1846-47	2,792
1847-48	2,111
1848-49	1,196
1849-50	1,184
1850-51	1,145
1851-52	1,168
1852-53	1,017
1853-54	701
1854-55	611
1855-56	718
1856-57	541

These figures show a steady decline in flatboat business up to 1860. The decline in general traffic of this form of craft becomes clearer if it be noted that of the 541 arrivals in 1856-57 at New Orleans 119 were coal flats from Pennsylvania and 136 were hay flats from Indiana. There was not in this year a single flatboat from the upper Mississippi or the Missouri, and only 12 from the Illinois. Flatboat trading after the original manner was resumed on a small scale after the civil war, the boats starting from Pittsburg and Wheeling, and was continued until the high price of lumber put an end to the peddling business.

Sailing vessels of various kinds also continued to play a part in lower Mississippi trade, especially below New Orleans, although they sometimes ascended as far as Natchez to bring down cotton and sugar. But the steamboat was gaining rapidly on all its competitors. In 1826, 57 per cent of the freight was carried to New Orleans by steamboat and only 43 per cent by other means.^a

The growing importance of the steamboat can be shown by presenting statistically the arrivals at New Orleans for a series of years.

Arrival of steamboats at New Orleans.^a

Year ending September 30—	Number.	Year ending September 30—	Number.
1814.....	21	1839.....	1,551
1815.....	40	1840.....	1,573
1819.....	191	1841.....	1,958
1820.....	198	1842.....	2,132
1821.....	202	1843.....	2,324
1822.....	287	1844.....	2,570
1823.....	392	1845.....	2,530
1824.....	436	1846.....	2,770
1825.....	502	1847.....	^b 1,024
1826.....	608	1848.....	2,917
1827.....	715	1849.....	2,873
1828.....	698	1850.....	2,784
1829.....	756	1851.....	2,918
1830.....	989	1852.....	2,778
1831.....	778	1853.....	3,252
1832.....	813	1854.....	3,076
1833.....	1,280	1855.....	2,763
1834.....	1,081	1856.....	2,956
1835.....	1,005	1857.....	2,745
1836.....	1,272	1858.....	3,264
1837.....	1,372	1859.....	3,259
1838.....	1,549	1860.....	3,506

^a Report on the Internal Commerce of the United States, 1887.

^b This figure is probably incorrect.

It will be seen that the steamboat arrivals, with certain slight recessions, steadily increased from the beginning of steamboat navigation until the civil war put a stop to commercial activity.

New Orleans, at the terminus of river transportation, grew with great rapidity, and was rated in 1840 as the fourth port in point of commerce in the world, exceeded only by London, Liverpool, and New York. Its exports were out of all proportion to its imports. It shipped heavy articles up the river, but for the finer classes of manufactures it left the Central West almost entirely dependent upon the eastern seaboard. Later, when the West went into manufacturing and Pittsburg and Cincinnati sent their manufactured goods south by river, New Orleans received them and reshipped them to the

^a Report on the Internal Commerce of the United States, 1887.

plantations, and these shipments constituted most of the upstream traffic from New Orleans. There seems to have been very little direct trade between the western cities and the southern plantations.

To present a detailed table of traffic receipts at New Orleans for a series of years is impracticable, because the units of measure in which the products are set down vary so frequently as to make comparison difficult, if not impossible. An incomplete presentation of receipts in tons is here reproduced from the Report on Internal Commerce for 1887, together with a statement of total value of receipts. The latter is partly estimated and is affected by currency and market conditions. Nevertheless, the general conclusion to be drawn from it is obvious. It should be noted that the statistics of traffic do not include rafted products or goods brought to market in small boats by planters, of which no record was kept, but do include products received by way of Lake Pontchartrain, principally cotton, which varied in amount from 1 per cent to 6 per cent of the total.

Tonnage and value of receipts at New Orleans from the interior, 1801-1860.

Year ending Sept. 30 -	Quantity.	Value.	Year ending Sept. 30 -	Quantity.	Value.
	<i>Tons.</i>			<i>Tons</i>	
1801.....	38,325	\$3,649,322	1834.....	327,800	\$29,820,817
1802.....	45,906	4,475,364	1835.....	399,900	37,566,842
1803.....	49,960	4,720,015	1836.....	437,100	39,237,762
1804.....		4,275,000	1837.....	401,500	43,515,402
1805.....		4,371,545	1838.....	559,600	45,627,720
1806.....		4,937,323	1839.....	399,500	42,263,880
1807.....		5,370,555	1840.....	537,400	49,763,825
1814.....	67,560		1841.....	542,500	49,822,115
1815.....	77,220		1842.....		45,716,045
1816.....	94,560	9,749,253	1843.....		53,728,054
1817.....	80,820	8,773,379	1844.....		60,094,716
1818.....	100,880	13,501,036	1845.....		67,199,122
1819.....	136,300	16,771,711	1846.....		77,193,464
1820.....	106,706	12,637,079	1847.....		90,033,256
1821.....	99,320	11,967,067	1848.....		79,779,151
1822.....	136,400	15,126,420	1849.....		81,989,692
1823.....	129,500	14,473,725	1850.....		96,897,873
1824.....	136,240	15,063,820	1851.....		106,924,083
1825.....	176,420	19,044,640	1852.....		108,051,708
1826.....	193,300	20,446,320	1853.....		134,233,735
1827.....	235,200	21,730,887	1854.....		115,336,798
1828.....	257,300	22,886,420	1855.....		117,106,823
1829.....	245,700	20,757,265	1856.....		144,256,081
1830.....	260,900	22,065,518	1857.....		158,061,369
1831.....	307,300	26,044,820	1858.....		167,155,546
1832.....	244,600	21,806,763	1859.....		172,952,669
1833.....	291,700	28,238,432	1860.....		185,211,251

At the beginning the products were miscellaneous in character, but they gradually became specialized, southern products such as cotton, sugar, and molasses predominating. Cotton, which in 1816 represented only 12 per cent in value of total receipts, came to comprise in the later part of the period from 60 to 75 per cent of the whole. "Western produce," which was 35 per cent in value of the total receipts in 1850, amounted to only about 23 per cent in 1860.

III.

OHIO RIVER COMMERCE.

Up to 1820 and for some little time thereafter the trade of the lower Mississippi took its origin largely in the Ohio basin, where settlement was most advanced. In 1820 the State of Ohio alone shipped 200,000 barrels of flour by river; in 1824 the total exceeded 300,000 barrels, which was one-quarter in value of all the products which descended the Mississippi.

During this period much engineering work of varying utility was executed on the Ohio and its tributaries, which contributed to a greater or less extent to the efficiency of the river system. So far as the open channel of the Ohio was concerned, improvement work was begun as early as 1827, although little of value was accomplished before 1860.^a Of the two tributaries at the head of navigation, the Allegheny was given up entirely to flats and rafts and was not navigable for even the lightest draft steamboats except during high water. So long as the supply of lumber upon its banks endured it furnished traffic for the river. Some of the lumber in the form of rafts of logs was floated to Cincinnati and below; much of it was converted at river ports into flats for downstream trading. To some extent it was converted into boards and shingles on the Allegheny and brought down in arks to Pittsburg, where the arks, relieved of their burden, were loaded with coal for Cincinnati, Louisville, and Natchez. It was estimated in 1848 that one-quarter of the lumber was sold at Pittsburg and the rest was carried farther down the Ohio.

So late as 1859 it was stated that the lumber annually run down the Allegheny amounted to over 150,000,000 feet.^b

The Monongahela River, which in its original condition could float light-draft flats and rafts in high and medium stages of water and steamboats at high water, was improved by a private corporation—the Monongahela Navigation Company—which completed six locks before 1860, two of them near Pittsburg being in operation in 1841. Upon this river the coal trade of the Ohio originated—the one form of river traffic which has persisted with any vigor to the present time. This trade began about 1840. In 1844 the total shipments amounted to 2,500,000 bushels. By 1847 the coal handled was about 12,000,000 bushels.

Until 1850 the method of handling was by means of large flat-bottomed boats or barges about 125 feet long and 8 feet deep. Each boat carried from 12,000 to 15,000 bushels of coal. They were ordinarily lashed together in pairs and floated down the river to destination, there to be sold for lumber. Each pair required the services of about twelve men. Inasmuch as the barges drew from 5½ to 7½ feet when loaded, they could only be floated safely during seasons of high water. There were generally two such stages a year, and during these relatively favorable seasons fleets of 250 to 300 barges set out upon their journey. Because their lading brought them so near the bed of the river and because they protruded so little above the water's surface, they were continuously subject to

^a For more detailed discussion see Report of Commissioner of Corporations on Transportation by Water in the United States, Part I, 1909.

^b Hunt's Merchants' Magazine, vol. 40, p. 604.

wreck from snags and rocks. Soon after 1850 the method of towing coal flats by steam towboats began.

Other tributaries of less importance which were improved to create more efficient connections with the main river, were the Muskingum, upon which the State of Ohio constructed eleven locks and dams, completed in 1840; the Kentucky, Green, and Barren rivers, improved by the State of Kentucky between 1835 and 1845 by the construction of locks and dams; and the Wabash River, upon which a lock and dam was built by the Wabash Navigation Company, chartered by the States of Illinois and Indiana, in 1846 and 1847.

Of more importance to the commerce of this section than any of the Ohio River tributaries just mentioned were the Cumberland and Tennessee rivers, both navigable for several hundred miles by steamboat. Indeed, the Tennessee River with its tributaries is navigable for steamboats a distance of 1,300 miles, and for rafts and flats an additional distance of more than 1,000 miles. Congress and the State of Kentucky made several appropriations for the improvement of the Cumberland between 1830 and 1840, and in 1846 the Cumberland Navigation Company was incorporated to improve navigation below Nashville, but little was accomplished during this period. From inland points in Alabama, Tennessee, and Kentucky by way of these two rivers came a large quantity of cotton, and most of the tobacco for southern markets and for export. During the few months of the year when the stage of water permitted, flatboats were extensively employed in this trade.

Probably the most important piece of river engineering from the standpoint of navigation, was the building of the Louisville and Portland Canal around the falls of the Ohio between Louisville and Shippingport, Ky. This was constructed by a private corporation chartered in 1825, the United States Government buying a majority of the stock. It was completed at the close of the year 1830, and in spite of the imposition of what seemed to be exorbitant tolls it had a most stimulating influence upon river commerce. Previously the flats and steamboats had been obliged to transfer their freight at Louisville to other craft sailing from Shippingport, below the falls, necessitating a laborious portage of $2\frac{1}{2}$ miles, or else, if they desired to make the through trip, the running of the rapids. Either expedient involved heavy expense and loss of time. Running the rapids meant waiting for a favorable stage of water, with loss of interest on capital, additional wages, and loss by depreciation in the value of products, and also the direct expense of pilotage. Transfer at Louisville meant damage to goods and drayage cost. The opening of the canal united the two river lines between Pittsburg and New Orleans and uninterrupted through traffic was possible. Boats which had been limited to a maximum load of 900 tons could now carry 1,700 tons. During the year 1831, 406 steamboats, 46 keel boats, and 357 flats, a total of 76,323 tons, passed through the locks.

The growth in steamboat tonnage on the Ohio may be observed from the statistics of the Louisville and Portland Canal. The variation in different years is due to the stage of water, which, when sufficiently good, diverted the boats from the canal to the direct route over the falls. Yet the figures show a fairly steady increase in number of boats.

Number of steamboats passing through the Louisville and Portland Canal, 1831-1849

1831.....	406
1832.....	453
1833.....	875
1834.....	938
1835.....	1,256
1836.....	1,182
1837.....	1,501
1838.....	1,058
1839.....	1,666
1840.....	1,231
1841.....	1,031
1842.....	983
1843.....	1,206
1844.....	1,476
1845.....	1,585
1846.....	1,626
1847.....	1,432
1848.....	1,523
1849.....	1,272

Among the cities along this commercial route, Pittsburg, as a result of its strategic location, early assumed a position of importance. It had been the outfitting port for emigrants in the pioneer days, and was now, because of its situation at the junction of the Allegheny and Monongahela, in a position to profit by the extensive traffic in lumber and coal. It had developed into an important shipbuilding center, and but for the difficulties of upper Ohio navigation and the extraordinary enterprise of the Ohio commercial interests, might have overpowered the city of Cincinnati to such an extent as to make of it merely a port of call.

However, Cincinnati during these decades, because of its situation at the head of good navigation, became one of the leading commercial cities of the West. During the entire period to 1860 it was surpassed in population by only one western city, New Orleans, and in the census statistics of 1850 and 1860 its total population very nearly equaled that of the seaport city. It began building steamboats in 1819, and from that time on was the center of this industry. Wheeling, a little below Pittsburg, became early an important outfitting point for flat-boat traffic.

Louisville, at the head of the falls of the Ohio, early acquired an importance, because it was the transshipping point between the upper and lower river. The construction of the Louisville and Portland Canal did not do away altogether with this geographical division of steamboat lines, and Louisville retained its place of importance as a river port throughout this period.

Evansville, situated equidistant from the mouth of the Ohio and the falls, was an important distributing point for a well-settled territory; its largest export by water was tobacco, brought in from the Kentucky fields across the river.

On the lower river, the more important ports, aside from New Orleans, were Memphis, Vicksburg, and Natchez. Each of these, in 1843, shipped more cotton by river to New Orleans than it did in 1887. The average annual shipments of Memphis steamers down river were 100,000 bales, of Vicksburg, 75,000 bales, and of Natchez, 50,000. Natchez was, however, a more important river point than Vicksburg, because it was the center of a more populous district. Nashville, on the Cumberland, was the center of a rich tobacco country, and sent large numbers of steamboats to New Orleans.

IV.

UPPER MISSISSIPPI COMMERCE.

The section watered by the sources of the Mississippi was occupied in the early part of this period by military garrisons and Indian traders. But it became before the war a region of active settlement, and furnished to the river a large amount of both freight and passenger traffic. The first steamboat that ascended the upper Mississippi is reported to have reached Fort Snelling, near St. Paul, in 1813. But the arrivals from that date until 1840 were few and far between, as the boats could be used only to transport supplies for traders and troops.

The total number of steamboat arrivals at St. Paul for the years 1844-1857 are here given, together with the length in days of the navigation season.

Number of steamboat arrivals at St. Paul and length of navigation season, 1844-1857.

Year.	Steamboat arrivals.	Length of navigation season.	Year.	Steamboat arrivals.	Length of navigation season.
		<i>Days.</i>			<i>Days.</i>
1844.....	41	231	1851.....	119	238
1845.....	48	234	1852.....	171	216
1846.....	24	245	1853.....	200	233
1847.....	47	236	1854.....	256	223
1848.....	63	241	1855.....	560	217
1849.....	95	242	1856.....	837	212
1850.....	104	239	1857.....	1,026	198

The sources of the traffic may be shown in a general way by a statement of the ports of departure of steamboats for St. Paul during the year 1857.

Arrivals of steamboats at St. Paul, 1857.^a

From—	
Dubuque.....	123
Prairie du Chien.....	138
Galena.....	213
Fulton.....	65
St. Louis.....	156
Cincinnati.....	12
Pittsburg.....	27
On the way to the Minnesota River.....	292
Total.....	1,026

The years 1845 to 1860 covered a period of active settlement in the Northwest, and the Mississippi was the most available means for reaching the new territory. Most of the boats were built in the shipyards along the Ohio. They were operated largely by their individual owners. During the fifties, when Minnesota was rapidly preparing for statehood, and when Wisconsin and Iowa had just been received into the Union, the demand for transportation up the river far exceeded the supply, and almost any price was paid for the privilege. The result was that boats often paid for themselves in two years out of their earnings. But the risks of snagging and burning

^a Hunt's Merchants' Magazine, vol. 38, p. 117.

were very great, and the depreciation on these boats was consequently heavy. The best boats for the upriver trade were the stern-wheelers of 200 to 300 tons, which were not liable to be hindered by the midsummer droughts. The boats that made the largest profits were those which in the later days of this period controlled the jobbing business and the railway connections at certain ports. This control was effected through the creation of pools between steamboat operators, which later developed in many instances into stock companies.^a

The three principal points on the river above St. Louis were Rock Island, Galena or Dunleith, and Prairie du Chien. The immigrants who settled Minnesota and Wisconsin reached the river at these points, being transported that far by rail after 1854. But these towns were not only transfer points for passengers. Galena was at this time second only to St. Louis as a wholesale center. Other important upriver ports were Burlington, Dubuque, and Davenport, Iowa, and Quincy, Ill. These places had their beginnings as river junctions, increased in importance as connections with the interior became closer, and continued even after the advent of railways to confine their interest to the river so long as the lumber supply endured. They were all important lumber-manufacturing towns.

The freight traffic by steamer seems to have been of the miscellaneous character natural in an exchange between primitive communities lacking railway facilities. Potatoes, barley, and furs are found in the list. Wooden ware was shipped from St. Paul as far south as St. Louis. One of the principal products from the upper river was wheat, which was shipped in 2-bushel sacks. A 200-ton boat would carry 300 tons of grain. There were also shipments of flour, which grew in importance as capital was invested in milling in the Northwest. Flour shipments on the Mississippi for the years 1841-42 to 1844-45 were as follows:

Shipments of flour on the upper Mississippi River.

	Barrels.
1841-42.....	439, 688
1842-43.....	521, 175
1843-44.....	502, 507
1844-45.....	533, 312

But by far the most important product of upper Mississippi transportation, from the beginning until its decline at the close of the century, was lumber. This was handled almost entirely in rafts or barges propelled by steamboats.

In the lower section of the upper Mississippi a large traffic was for many years carried on in lead, principally from the Galena mines, and a smaller trade in Wisconsin copper. Large quantities of lead were annually transshipped at St. Louis for New Orleans, amounting in value in 1843 to more than \$1,000,000, and estimated to be worth 3½ cents per pound. A small part of this total came from points in Missouri by way of the Missouri River.

^a Merrick, *Old Times on the Upper Mississippi*, 1909.

The following table gives the shipments of lead from Galena, Dubuque, and all other up-river ports for a series of years:

Total shipments of lead, in pigs, from Galena, Dubuque, and all other ports of upper Mississippi, 1841-1854.^a

	Pigs. ^b
1841.....	452, 814
1842.....	447, 859
1843.....	561, 321
1844.....	624, 601
1845.....	778, 460
1846.....	732, 403
1847.....	772, 656
1849.....	590, 293
1850.....	573, 502
1851.....	503, 571
1854.....	402, 343

After 1854, when the railway reached the Mississippi, the lead traffic on the upper river rapidly disappeared.

The steady growth in the business of this portion of the river may be observed from the statistics of steamboat arrivals at St. Louis from the upper Mississippi for a series of years. These include all arrivals from Mississippi River ports north of the mouth of the Ohio.

Arrivals of steamboats at St. Louis from upper Mississippi ports, 1841-1852.

1841.....	143
1842.....	195
1843.....	244
1845.....	647
1846.....	663
1847.....	717
1848.....	697
1849.....	806
1850.....	635
1851.....	639
1852.....	705

The upper Mississippi business was considerably augmented before it reached St. Louis by that of the Illinois River and the Illinois and Michigan Canal. The latter was opened in 1848, and while inadequate for extensive traffic, it furnished, nevertheless, some freight to the Illinois River steamers, which transported goods back and forth between Peoria and other interior Illinois points on the one hand, and St. Louis and points on the Ohio and lower Mississippi on the other.

V.

MISSOURI RIVER COMMERCE.

The traffic of the Missouri River has never reached a position of great importance, and statistical material bearing upon it is very meager. Such commercial value as the river possessed was confined largely to the period preceding 1860, and even then its service consisted principally in facilitating the fur trade and carrying products to the military garrisons on its upper reaches. The American Fur

^a From Hunt's Merchant's Magazine.

^b A pig weighed about 60 pounds.

Company and some independent traders employed a number of steamboats and other craft, and at least once a year ascended the river to the mouth of the Yellowstone with supplies for fur trading, and the United States Army carried its supplies by boat up as far as Fort Benton. So late as 1860 the total value of the fur trade of St. Louis was \$529,000, of which nearly all came down the Missouri River by boat. The river was also used to a considerable extent as a means of approach to the Santa Fe trail, which made junction with the river at Independence. The river trade between St. Louis and Santa Fe was valued in 1848 at \$500,000 per year.

The first steamboat ascended in 1819, and from then on steamboating slowly developed. River navigation for the years 1838-1843 was as follows:

Steamboat navigation of the Missouri River, 1838-1843.^a

Year.	Boats.	Trips.
1838.....	17	96
1839.....	35	141
1840.....	28	147
1841.....	32	162
1842.....	29	88
1843.....	26	205

^a Hunt's Merchants' Magazine, vol. 18, p. 103.

The arrivals at St. Louis of boats from the Missouri River for the years 1845-1852 are presented in tabular form.

Arrivals of steamboats at St. Louis from the Missouri River, 1845-1852.

1845.....	249
1846.....	256
1847.....	314
1848.....	327
1849.....	355
1850.....	390
1851.....	301
1852.....	317

This table shows that commerce did not develop rapidly in this section. The figures are more significant if compared with the arrivals from the upper Mississippi, the Illinois, and the Ohio, which were much in excess of those from the Missouri, and were increasing rapidly. Aside from the difficulties of navigation due to the turbid and uncertain channel, the snags, the floods, and the droughts, there was the fundamental condition present that there existed on the upper Missouri previous to 1860 little industrial basis for an extensive river commerce. After 1860, the railways were the active agency in the settlement of this section, and the country once settled, this more efficient means of transportation was almost exclusively resorted to. The Missouri River has played practically no part in the industrial development of the west.

VI.

ST. LOUIS.

St. Louis was one of the important river cities of this period. It enjoyed the advantage of being a port of transshipment for a very large proportion of the river traffic, and was the great wholesale center of the Middle West. Most lines of steamboats engaged in through traffic on the Missouri, the upper and lower Mississippi, and the Ohio had St. Louis as one of their termini. The only important exceptions were the steamboat lines between Ohio River points and New Orleans, most of which did not touch St. Louis at all.

Hence, by reason of its location, there are found among the receipts of this city by river all the products which the rivers handled, including the grains and flour, lumber, lead, pork, lard, and bacon, the southern products, sugar, coffee, and molasses, and the miscellaneous food products. In and out of this metropolis the steamboats also carried what was for the time an enormous passenger business. Gold seekers, fur and Indian traders, immigrants, pioneers, and home seekers poured into St. Louis in the fifties, and found their way in and out by the river gate. The number of passengers carried on steamboats to and from St. Louis for the year ending September 30, 1855, is reported as 1,045,269.^a The central location of this city and its growing commercial importance is seen from a statement of the steamboat arrivals.

Arrivals of steamboats at St. Louis, 1839-1859.

1839.....	1, 476
1840.....	1, 721
1841.....	1, 928
1844.....	2, 105
1845.....	2, 050
1846.....	2, 412
1847.....	3, 069
1848.....	3, 159
1849.....	2, 905
1850.....	2, 897
1851.....	2, 628
1852.....	3, 184
1853.....	3, 307
1855.....	3, 449
1856.....	3, 065
1857.....	3, 443
1858.....	3, 160
1859.....	3, 149

VII.

CANAL-LAKE COMPETITION.

The first danger that threatened the continued prosperity of river commerce came with the completion of the Erie Canal in 1825. The people of the Middle West and of the Ohio Valley were not slow to realize the advantage which a route including the Great Lakes and the Erie Canal would have in reaching seaboard markets, over the 2,000-mile river trip to New Orleans and the long coastwise jour-

^aHunt's Merchants' Magazine, vol. 33, p. 637.

ney. So early as 1832 the enterprising population of Ohio had completed canals from Portsmouth, on the Ohio, to Cleveland, and from Cincinnati to Toledo, and in 1835 there was shipped from this State to New York, by way of the Erie Canal, 86,000 barrels of flour, 98,000 bushels of wheat, 2,500,000 of staves, and much miscellaneous freight. The Ohio canals were built for local reasons and it was the local trade which sustained them during their years of prosperity. Yet they served as feeders for both the southern and eastern routes and helped to draw traffic away from its old course.^a

Indiana likewise sought to reach eastern markets by the northern route, and constructed a canal from Evansville northeastward to connect with the Cincinnati-Toledo enterprise. Both in Indiana and Illinois the same competitive conditions existed as in Ohio, but with a stronger tendency in the former toward the river route. Not only did shipments, by way of the Erie Canal, particularly of wheat and flour, steadily increase, but the Pennsylvania Canal also transported a variety of products, including tobacco, which had formerly gone down the river, and took manufactures from about Pittsburg, and large quantities of lard, bacon, and other western produce. It imported various manufactured goods and household supplies for the people of the upper Ohio Valley. In 1846, Buffalo for the first time exceeded New Orleans in its receipts of flour and wheat.

The Cincinnati Price Current in 1852 contained a letter from Cincinnati merchants urging the greater cheapness of the northern route, and making the following comparative estimate of the cost of shipping a single hogshead of tobacco from Louisville:

BY NORTHERN ROUTE.

Dray, Louisville.....	\$0. 25
Freight to Cincinnati.....	1. 05
Charges in Cincinnati.....	. 50
Freight by canal and lake.....	7. 75
Insurance.....	1. 12
	<hr/>
	10. 67

BY SOUTHERN ROUTE.

Dray, Louisville.....	\$0. 50
Freight to New Orleans.....	2. 50
Insurance to New Orleans.....	. 62
Charges in New Orleans.....	1. 75
Freight by ship.....	7. 00
Insurance.....	2. 00
	<hr/>
	14. 37

The point of highest traffic on the Ohio canals was reached in 1857, when the total amount carried was 1,635,744 tons. By 1850 the line of division between products moving south to the river and north to the Lakes had become rather clearly defined, and was somewhere near the center of the State. The tendency of breadstuffs was toward the Lakes, as already indicated, but beef, lard, pork, bacon, and corn still went mostly by river. This was in part due to the natural distribution of the supply of products in the State, and in part to the location of the demand for the different kinds of produce.

^a Gephart, Transportation and Industrial Development in the Middle West, pp. 118-119.

But it appears certain that the river trade did not suffer seriously from the competition of eastward water routes during the period 1825 to 1850. Rather was it changing its character and including a larger proportion of southern and a smaller proportion of western products.

The following tables give the value of products received at the seaboard and the movement toward the interior in 1851 by the various routes:

Reported value of products received at seaboard, 1851.^a

Via the Mississippi.....	\$108,051,708
Via canals and the Hudson.....	53,027,508
Via the St. Lawrence.....	9,153,580
Via the New York railroads.....	11,405,350

Movement toward the interior, 1851.

Via the Mississippi.....	\$38,874,782
Via the Hudson and canals.....	80,739,899
Via the St. Lawrence.....	10,956,793
Via the New York railroads.....	44,556,000

These tables, besides showing the relative importance of Mississippi River traffic, bring out the preponderance of export over import traffic at New Orleans referred to elsewhere.

VIII.

RATES AND FARES.

No satisfactory material is available on the question of rates during the period preceding the introduction of railways into the West, and only general statements may here be ventured. In 1819, when steamboating on western rivers was first freed from the Fulton monopoly, through passenger rates upstream were about 10 cents per mile, varying somewhat for the longer distances, and 12½ cents per mile for way passengers. The downstream rate was about 6 cents per mile. It is probable, however, that these rates included board en route, and allowance should be made for this in comparing them with modern rates. A few typical fares may be quoted.

Passenger fares by steamboat, 1819.

	Miles.	Fares.
New Orleans to Natchez.....	263	\$30
New Orleans to mouth of Ohio.....	961	95
New Orleans to falls of Ohio.....	1,328	125
Falls of Ohio to New Orleans.....	1,328	75
Falls of Ohio to mouth of Ohio.....	367	20
Falls of Ohio to Natchez.....	1,065	60
Cincinnati to Louisville.....	129	12

On the upper Mississippi, the fares had fallen by 1840 to from 4 to 5 cents per mile for short distances and 3 cents per mile for long distances. Deducting the price of meals and stateroom, the charge was from 1½ cents to 3 cents per mile. Deck passengers, who were

^a Ringwalt, Development of Transportation Systems in the United States, p. 121.

expected to provide their own food, traveled at fares which frequently did not exceed a half cent per mile, and this they could still further reduce by assisting the crews to gather fuel at the various stopping places.

There were no such things as typical freight rates during the era of steamboating. Rates varied widely with the supply and demand of boats, the stage of water, and the quantities of freight offered, and it is difficult to give any idea of them at all. For example, one writer quotes a rate in 1819 of 15 cents per 100 pounds from Cincinnati to Louisville, or 2.3 cents per ton-mile, and another rate in the same year from Cincinnati to St. Louis of 50 cents per 100 pounds, or \$1.44 per ton-mile. Gephart states^a that the freight rates from New Orleans to northern cities in 1822 were as follows: General merchandise, 3 to 4 cents per pound; cotton, 1 cent per pound; sugar, \$7 per barrel. These rates were probably not more than half as high as the rates charged before the appearance of steamboats. So early as 1839, rates were quoted from New Orleans to St. Louis of 75 cents per 100 pounds or \$0.013 per ton-mile, and from New Orleans to Louisville of 50 cents per 100 pounds, or \$0.008 per ton-mile, the latter rate being lower because of the greater competition on this line. In seasons when a good stage of water prevailed, between 1850 and 1860, freight was carried from Pittsburg to St. Louis and Nashville at 43 mills per ton-mile, and from Pittsburg to New Orleans at 36 mills per ton-mile. Merriek^b states that freight rates varied on the upper Mississippi in the fifties from 25 cents per 100 pounds for short distances, to \$1.50 per 100 pounds from Galena to St. Paul, the latter being nearly 10 cents per ton-mile. No package was carried for less than 25 cents. To the rates themselves must be added the cost of marine insurance, which, because of the hazardous nature of the steamboat business, was a very heavy expense. In 1840 the insurance rate quoted was about 1 $\frac{3}{4}$ per cent of the value of the goods for a distance of about 200 miles above New Orleans; then it steadily increased to 4 per cent and above on the upper Mississippi. On the Ohio the rates varied from 2 $\frac{3}{4}$ to 3 $\frac{3}{4}$ per cent, on the Missouri from 3 $\frac{5}{8}$ to 6 $\frac{1}{2}$ per cent.^c

Downstream rates for both passenger and freight traffic were usually lower than those levied on upstream business, because, the time consumed being less, the cost of operation was less in fuel and power expended, and, in the case of the passenger business, the expense of boarding the passengers was reduced. But these factors might be entirely offset by the supply of and demand for space in the two directions at different seasons of the year. In fact too much reliance should not be placed upon any casual statement of rates or fares, because, being subject to no control whatever except such as the laws of trade enforced, steamboat captains charged in all cases what the traffic would bear. It was frequently much more advantageous to a prospective passenger to pay the exorbitant fare demanded than to stay in port and take his chances with the next boat, and a shipper had to get his products to market at any cost. The days of prosperous steamboating were the days of unregulated monopoly, and the variations in water depth and the uncertainties

^a Transportation and Industrial Development in the Middle West, p. 98, note.

^b Old Times on the Upper Mississippi, 1909.

^c Hunt's Merchants' Magazine, vol. 2, p. 80.

of travel often so crowded the limited traffic season that in the direction of traffic movement passengers and shippers were wholly at the mercy of the steamboat captains. Small wonder that boats were often paid for out of the earnings of a couple of years. Yet they were continuously liable to destruction from snags, bars, collisions, explosions, and burning. And even if they survived these terrors, so flimsily were they built and so recklessly were they run that most of them were unfit for service after five years.

The following table is made up from monthly quotations of rates on typical shipments on two steamboat lines which were operating where conditions were probably more stable at the time than on any other part of our inland waterway system:

Summary of monthly quotations of river rates of freight, Cincinnati to New Orleans, 1849-1853.^a

Product shipped.	1848-49.	1849-50.	1850-51.	1851-52.	1852-53.
Flour, per barrel.....	\$0.30-\$0.75	\$0.25-\$1.25	\$0.35-\$1.00	\$0.30-\$0.75	\$0.30-\$1.00
Pork, per barrel.....	.40- .75	.25- .875	.40- .90	.35- 1.00	.35- 1.00
Whisky, per barrel.....	.45- 2.50	.40- 1.00	.50- 1.50	.45- 2.50	.50- 2.00

Summary of monthly quotations of river rates of freight, Cincinnati to Pittsburg, 1849-1853.^a

Product shipped.	1848-49.	1849-50.	1850-51.	1851-52.	1852-53.
Whisky, per barrel.....	\$0.35-\$1.50	\$0.35-\$0.75	\$0.33-\$0.75	\$0.30-\$1.50	\$0.35-\$1.50
Merchandise, per 100 pounds.....	.10- .50	.10- .55	.10- .25	.10- .50	.125- .75

^a From Hunt's Merchants' Magazine.

IX.

SPEED AND ACCIDENTS.

Steamboat disasters on the Mississippi during the forty years from 1810 to 1850 have been thus summarized:^a

Total number of steamboats lost.....	1,070
Tonnage.....	85,256
Cost.....	\$7,113,940
Persons killed and injured.....	4,180

Many of the accidents were due to conditions of navigation over which the navigators had no control, but many more were due to reckless steamboating. So long as there was no rail competition, speed was an object. A speed record was a profitable means of advertising, and the desire to attain it led to racing and resulted frequently in collisions and explosions.

Steamboats were being steadily perfected, and the length of time consumed between river ports was constantly reduced. The average rate of speed on the Mississippi and Ohio in 1840 was about 6 miles per hour upstream and 10 to 12 miles downstream, but this rate was frequently exceeded.

The following tables show the increase in steamboat power during the period up to 1860.

^a Report on Internal Commerce of the United States, 1887.

Average time of steamboats between points named.^a

	Year.	Time.
New Orleans to St. Louis	1815	25 days.
	1823	12 days.
	1826	9 days, 12 hours.
	1828	9 days, 4 hours.
	1860	3 days (running time).
New Orleans to Louisville	1819	20 days.
	1826	10 to 14 days.
	1840	6 days.
Louisville to New Orleans	1819	10 days.
	1826	6 days.
	1840	4 days.
Louisville to Cincinnati	1819	40 hours.
	1840	15 hours.
Cincinnati to Louisville	1819	18 hours.
	1840	11 hours.

^a Hunt's Merchants' Magazine, vol. 48.

The following are taken from a list of speed records of individual boats:^b

	Year.	Time.
New Orleans to Cairo (961 miles)	1844	3 days, 6 hours, 44 minutes.
	1854	3 days, 3 hours, 40 minutes.
	1870	3 days, 1 hour, 1 minute.
New Orleans to Louisville (1,328 miles)	1815	25 days, 2 hours, 4 minutes.
	1819	20 days, 4 hours, 20 minutes.
	1828	18 days, 10 hours.
	1834	8 days, 4 hours.
	1842	5 days, 14 hours.
	1852	4 days, 20 hours.
	1859	4 days, 9 hours, 19 minutes.
New Orleans to Cincinnati (1,457 miles)	1843	5 days, 18 hours.
	1881	5 days, 12 hours.

X.

THE BEGINNING OF RAILWAY COMPETITION.

With the appearance of railways in the West begins the downfall of river commerce. In order to make clear the manner in which railways invaded the territory previously served by the waterways, the following table is presented, showing the more important railway lines opened for business previous to 1860 which touched any one of the waterways under consideration, together with the date of opening, the water terminus of the line, and the present name of the corporation:

Table of principal western railways, 1841-1860.

Name of railway.	Date of opening.	Water terminus.	Present name of owning or controlling corporation.
OHIO.			
Little Miami	1846	Cincinnati	Pittsburg, Cincinnati, Chicago and St. Louis.
Cleveland, Columbus and Cincinnati	1851	.....do.....	Cleveland, Cincinnati, Chicago and St. Louis.
Cleveland and Pittsburg	1852	Cleveland, Pittsburg	Pennsylvania.
Marletta and Cincinnati	1857	Cincinnati	Baltimore and Ohio.

^b Report on Internal Commerce of the United States, 1887.

Table of principal western railways, 1841-1860—Continued.

Name of railway.	Date of opening.	Water terminus.	Present name of owning or controlling corporation.
INDIANA.			
Madison and Indianapolis.....	1847	Madison.....	Pittsburg, Cincinnati, Chicago and St. Louis.
Indiana Central.....	1853	Across the State.....	Do.
Indianapolis and Terre Haute.....		New Albany.....	Chicago, Indianapolis and Louisville.
New Albany and Salem.....	1854	Evansville.....	Evansville and Terre Haute.
Evansville and Crawfordsville.....	1858		
KENTUCKY.			
Louisville and Frankfort.....	1851	Louisville.....	Louisville and Nashville.
ILLINOIS.			
Chicago and Rock Island.....	1854	Rock Island.....	Chicago, Rock Island and Pacific.
Galena and Chicago (jointly with Illinois Central).	1855	Galena.....	Chicago and Northwestern.
Chicago and Alton.....	1855	Alton.....	Chicago and Alton.
Chicago, Burlington and Quincy...	1856	Quincy.....	Chicago, Burlington and Quincy.
Illinois Central.....	1856	Cairo, Dunleith.....	Illinois Central.
Terre Haute and Alton.....	1854	Alton, Ill.....	Cleveland, Cincinnati, Chicago and St. Louis.
Ohio and Mississippi.....	1857	Cincinnati, Ohio; East St. Louis, Ill.	Baltimore and Ohio Southwestern.
WISCONSIN.			
Milwaukee and Prairie du Chien....	1857	Prairie du Chien.....	Chicago, Milwaukee and St. Paul.
Milwaukee and La Crosse.....	1858	La Crosse.....	Do.
MISSOURI.			
Pacific of Missouri (40 miles).....	1853	St. Louis.....	Missouri Pacific and St. Louis and San Francisco.
Hannibal and St. Joseph.....	1859	Hannibal, St. Joseph..	Hannibal and St. Joseph.
TENNESSEE.			
Western and Atlantic of Georgia....	1850	Chattanooga.....	Nashville, Chattanooga and St. Louis.
Nashville and Chattanooga.....	1854	Nashville, Chattanooga	Do.
Virginia and Tennessee.....	1856	Chattanooga.....	Norfolk and Western.
Memphis and Charleston.....	1857	Memphis, Chattanooga.	Southern.
East Tennessee and Virginia.....	1858	Chattanooga.....	Do.
Mobile and Ohio.....	1859	Columbus, Ky.; Mobile, Ala.	Mobile and Ohio.
Louisville and Nashville.....	1859	Louisville, Ky.; Nashville, Tenn.	Louisville and Nashville.
MISSISSIPPI.			
Vicksburg and Jackson.....	1841	Vicksburg.....	Alabama and Vicksburg.

It appears from this table that railway building in the West began in the decade 1840-1850, and that the practice of building comparatively short railway lines to connect with the waterways developed rapidly during the next decade. These water and rail junctions were established all the way down the Ohio and lower Mississippi and on the upper Mississippi as far north as La Crosse, Wis., as well as on the Cumberland, Tennessee, and Missouri. Among these junction points were Pittsburg, Pa.; Cincinnati, Ohio; Louisville, Ky.; Madison, New Albany, and Evansville, Ind., on the Ohio River; Chattanooga, Tenn., on the Tennessee River; Nashville, Tenn., on the Cumberland River; Cairo, Ill., Columbus, Ky., Memphis, Tenn., and Vicksburg, Miss., on the lower Mississippi; St. Louis and Hannibal, Mo., Alton, Quincy, Rock Island, Galena, and Dunleith, Ill., Prairie du Chien and La Crosse, Wis., on the upper Mississippi; and St. Joseph, Mo., on the Missouri River.

There is some basis in this situation for the statement so often made that railways at the beginning were merely short lines connecting interior communities with waterways and were intended to supplement and not compete with waterway facilities.

For example, the Vicksburg and Jackson acted merely as a tributary to the river and transported cotton from the interior for shipment. Its business in cotton grew from 34,901 bales in 1847 to 97,868 bales in 1853.^a The Pennsylvania Railroad for a time after reaching Pittsburg was dependent upon the Ohio for traffic connections with the West. The president of the Madison and Indianapolis, in his annual report for 1850, made the following statement:

The wharfage in front of the freight depot at Madison has been completed. The Cincinnati and Louisville packets now receive and discharge their freight and passengers at this point.

One reason why railways at the beginning did not at once supersede the waterways was that it was some time before they were properly organized and equipped to carry freight. The Baltimore and Ohio in 1831 had carried only 593 tons of freight, but had transported 81,905 passengers. The Cincinnati, Hamilton and Dayton was opened in 1852 for the operation of passenger trains only.^b It required some effort on the part of railways to draw the bulky freight away from the waterways.

Yet, if the policy of cooperation prevailed at the beginning it had only a brief term of existence, for the economic conditions were such as to drive railways inevitably into the position of competitors. Referring again to the railways mentioned in the table, it may be noted that in Ohio the Little Miami, in connection with the Mad River Railroad, formed in 1848 the first through line between Lake Erie and the Ohio River, and that a second through line was created in 1851 by the Little Miami and the Cleveland, Columbus and Cincinnati. These highways across the State were inclined, like the canals, to divert traffic northward to the Lakes and thence to the eastern markets. But it was not long that the Lakes had to be relied upon for transportation eastward. The trunk lines of the Atlantic seaboard, spurred on by the rivalry of the seaboard cities, were pushing their way rapidly westward, and many of them took their course through the advantageous opening south of the Lakes and north of the mountains offered by the State of Ohio. The last link between Chicago and New York in what is known to-day as the "Vanderbilt system" was completed between Cleveland and Toledo in 1853. The Cleveland and Pittsburg, which formed a part of the Pennsylvania, began operations in 1852, and the Pittsburg, Fort Wayne and Chicago reached Chicago in 1858, forming the first continuous line through Ohio from the Ohio River to Chicago. The Baltimore and Ohio, as it passed through the State, extended its line to Cincinnati in 1857 by means of the Marietta and Cincinnati. The State of Ohio was therefore by 1860 opened up by rail lines in all directions. The same influences were at work elsewhere. Across the State of Indiana ran several lines, including the Indiana Central and the Indianapolis and Terre Haute. The Terre Haute and Alton and the Ohio and Mississippi both paralleled the Ohio River

^a Report on Internal Commerce of the United States, 1887.

^b Gephart, *op. cit.*, p. 172.

and reached out to the Mississippi. The New Albany and Salem, opened in 1854, was the first line entirely within the State of Indiana connecting the Ohio River, at the foot of the falls, with the Lakes.

Farther south railroad building was less advanced, yet even in that territory roads from the East were seeking western waterway connections, with no other possible purpose than to turn traffic eastward which had earlier been moving west and south. For example, the Western and Atlantic of Georgia opened a route from Atlanta to Chattanooga on the Tennessee River in 1850, the Virginia system of railroads made connection with the same city through the opening of the Virginia and Tennessee in 1856 and the East Tennessee and Virginia in 1858. At the same time Chattanooga was pushing its influence westward, and had secured a connection with Nashville on the Cumberland in 1854 and with Memphis on the Mississippi in 1857. Two years later there was direct connection by rail between Louisville on the Ohio and Nashville, and between Mobile, Ala., and Columbus, Ky., on the Mississippi, a short distance below Cairo. In 1860 the Vicksburg and Jackson was extended to Meridian, where it met the Mobile and Ohio, and thus made possible the diversion of traffic from the Mississippi eastward.

On the upper Mississippi the first railroad connection with Chicago was made at Rock Island in 1854. Previous to this time only a small proportion of the exports of Illinois had been sent to market by the Lakes and the Erie Canal. The Illinois River, navigable to within 100 miles of Chicago, and the Mississippi along the western border of the State, had given a southerly direction to a good share of its products. All the products of the west bank of the Mississippi and the greater part of those of the east bank had gone to New Orleans. But now all was to be changed. The Rock Island connection with the Mississippi was followed by junctions at Galena and Alton in 1855, and the next year the Illinois Central had a line paralleling the river all the way from Dunleith, opposite Dubuque, to Cairo. Lines also connected Milwaukee, on Lake Michigan, with Prairie du Chien and La Crosse, on the Mississippi, in 1857 and 1858. West of the river there were no railways of importance previous to 1860, except the Hannibal and St. Joseph, opened in 1859, the Mississippi and Missouri from Davenport to Iowa City, Iowa, 55 miles, and the Pacific Railroad, constructed westward from St. Louis for a short distance.

That these various short roads to the Mississippi and the Ohio ceased construction for a time with the attainment of their river junctions was due in no sense to the fact that they regarded themselves as waterway feeders. The leading causes for the suspension of railroad building were found, first, in the financial situation which culminated in the panic of 1857; second, in the disturbance to business and credit which came with the civil war; and third, to the difficulties in the way of bridging the Ohio and Mississippi. The first two causes require no discussion. The bridge problem was an interesting one. A highway drawbridge had been erected over the Ohio at Wheeling in 1849, and between 1853 and 1856 the Chicago and Rock Island had built a bridge across the Mississippi between Rock Island and Davenport to make connection with the Mississippi and Missouri Railroad in Iowa. Both bridges had been built by state authorization alone, and without the sanction of Congress. Both interfered seriously with navigation. For these reasons further

bridging was bitterly fought. The opposition of steamboat interests, prompted in part, at least, by a desire to check railroad advance and compel alliance with the waterways, had a legitimate basis in the contention that unless bridges were provided with draws, reconstruction of the smokestacks and pilot houses of the steamboats would be necessary, and that unless the piers were placed wide apart, and spans of 500 feet were constructed, rafting and barging would be seriously hampered. Congressional investigation followed, resulting in general legislation under which bridges were built in the late sixties and in the seventies. Then the railways continued their course west and south, or made lines continuous which were already in existence on either bank of the river; but until congressional authorization had been secured, the railways rested in their westward and southward advance.

Even in the decade previous to the civil war the railways, with their through lines from Chicago to New York and their connections with the Mississippi and the Ohio, had already begun to draw traffic eastward, and to diminish the river commerce to New Orleans in northern products, or in what was known in New Orleans as "western produce." This may be shown in a general way by presenting a table which gives for the eleven years preceding the war the value of "southern produce," in detail, and the aggregate value of other products, mainly from the North and West.

Value of receipts of produce at New Orleans, 1850-1860.^a

Year ending September 30—	Cotton.	Sugar.	Molasses.	Tobacco.	Other products.	Total.
1850.....	\$41,885,156	\$12,396,150	\$2,400,000	\$6,166,400	\$31,049,173	\$96,897,873
1851.....	48,756,764	12,678,180	2,625,000	7,736,000	35,127,539	106,924,083
1852.....	48,592,222	11,827,350	4,026,000	7,196,185	36,109,951	108,051,708
1853.....	68,759,424	15,452,688	5,140,000	7,938,650	37,442,973	134,233,735
1854.....	54,749,602	15,726,340	3,720,000	4,228,100	36,912,756	115,336,798
1855.....	51,390,720	18,025,020	1,255,000	7,111,370	39,421,713	117,106,823
1856.....	70,371,720	16,199,890	4,582,242	7,982,800	45,119,429	144,256,081
1857.....	86,255,079	8,137,310	2,685,300	11,892,120	49,091,510	158,061,309
1858.....	88,127,340	17,900,608	4,001,015	13,628,327	42,798,256	167,155,546
1859.....	92,037,794	24,998,424	6,470,817	9,164,750	40,283,879	172,952,669
1860.....	109,389,228	18,190,880	6,250,335	8,999,325	42,881,486	185,211,254

While the value of receipts at New Orleans during these years increased 93 per cent and while receipts of cotton increased 166 per cent, sugar 50 per cent, molasses 160 per cent, and tobacco about 33 per cent, both sugar and tobacco having been still higher in value in some of the intervening years, the value of "other products" increased only 26 per cent. These statistics do not show quantities, hence final conclusions can not be drawn from them, but they clearly show the tendency. During the years 1854-1858, western produce represented but 18 per cent of the total receipts at New Orleans as compared with 61 per cent in the early years of river commerce.^a Traffic in large quantities still continued to be handled on the Ohio between Cincinnati and Pittsburg and between Cincinnati and St. Louis, and also to a considerable degree on the upper Mississippi

^a Report on Internal Commerce of the United States, 1887.

as far south as St. Louis, but dependence upon New Orleans as a market was being gradually lessened.

The year immediately preceding the outbreak of the war, 1859-60, was the best year on the river for New Orleans. The city received the heaviest shipments and the steam river tonnage entered at the port was the largest ever recorded. There reached New Orleans that season by river 2,187,560 tons of freight, and the total river trade of the city was valued at \$289,565,000.^a The significant fact concerning this trade, however, was its comparatively local character. Of the total steamboat arrivals at New Orleans for the year 1859-60, amounting to 3,540, 1,835 were from the State of Louisiana and 576 from the neighboring States of Mississippi, Arkansas, and Texas. New Orleans had no railway worth mentioning in 1860, but the city controlled the entire river trade, commerce, and crops of the State of Louisiana. By means of the Red River, she secured a hold on the crops of northern Texas. The greater portion of Indian Territory, the larger part of Arkansas, all the Ouachita and Arkansas valleys, a portion of the White River trade running up into Missouri, were at the command of the Crescent City. The State of Mississippi was subject to New Orleans, except for its eastern portion through which the Mobile and Ohio Railroad now ran. Western Tennessee and a large portion of Kentucky still sent their products south, and probably one-fifth of the produce of the Ohio Valley and one-third of that of the upper Mississippi still found its way to New Orleans. But the significant thing was that the western produce then moving south was wholly for local consumption and not for export. It was to supply the planters with food products and supplies, in order that they might devote their attention exclusively to cotton raising. The export business in northern products had turned eastward.

The traffic of the Mississippi and Ohio rivers and their tributaries had been tapped at many points. Produce formerly traveling to New Orleans by flatboat from the upper Tennessee was now carried largely to Charleston, Savannah, and other seaboard cities. The receipts at New Orleans from northern Alabama were less in 1860 than in 1845, notwithstanding a steady gain in the prosperity of that section. At Cincinnati a large portion of the flour and grain formerly sent down the Ohio now went to Pittsburg by river and thence by rail; or by canal to Toledo, and thence by lake and canal or rail to the seaboard, or to some slight extent "all rail." With the establishment at Galena of through connections with the east in 1855, the lead trade on the river which had gone via New Orleans to New York and Europe suddenly dropped off and soon disappeared altogether.

At Cincinnati, for the year 1857, there were received a total of 886,900 tons of merchandise, and there were shipped 528,110 tons, of which a little over 10 per cent in and out was handled by rail. This was an increase of 17 per cent in rail tonnage over the year previous. At Louisville, in 1857, 13 per cent of the flour, 8 per cent of the wheat 29 per cent of the corn, 26 per cent of the whisky, and 10 per cent of the coffee were received by rail. At St. Louis, of the flour received in barrels 15 per cent came by rail in 1857, 27 per cent in 1858, and 33 per cent in 1859. Davenport, Iowa, the river terminus of the Mississippi and Missouri Railroad, opposite Rock Island, Ill., received in 1857 large quantities of lumber, shingles,

^a Report on Internal Commerce of the United States, 1887.

railroad iron, coal, and corn by way of the Chicago and Rock Island Railroad, and wheat, pork, flour, and wool from the West by the Mississippi and Missouri Railroad. By way of the river the principal product received was lumber, which amounted to nearly twice that received by rail. The aggregate exports and imports for the year were estimated at 93,683 tons, of which 87 per cent was handled by rail. But Davenport had the first bridge across the Mississippi, and thereby had earlier secured rail connections with the East.

The following table, presenting the shipments of flour and grain in bushels from Chicago for a series of years, shows in a striking way the influence of railway extension westward from the city. It will be observed that in 1854, the first year of railway connection with the Mississippi River, the shipments were doubled.

Total shipments eastward of flour and grain from Chicago, 1838-1863. ^a

	Bushels.
1838.....	78
1839.....	3, 678
1840.....	10, 000
1841.....	40, 000
1842.....	586, 907
1843.....	688, 907
1844.....	923, 494
1845.....	1, 024, 620
1846.....	1, 599, 819
1847.....	2, 243, 201
1848.....	3, 001, 740
1849.....	2, 895, 959
1850.....	1, 858, 928
1851.....	4, 646, 591
1852.....	5, 873, 141
1853.....	6, 422, 181
1854.....	12, 902, 320
1855.....	16, 633, 645
1856.....	21, 583, 221
1857.....	18, 032, 678
1860.....	34, 109, 059
1863.....	54, 741, 839

These instances cited do not completely cover the extent and power of the railroad influence in the decade before the war, but it is unnecessary to go further into detail. The examples are typical of the situation.

The development of transportation agencies before 1860 may be summarized broadly by the statement that up to 1850 water routes, including the coastwise and gulf lines, constituted the principal ways of freight movement, while the business on the Lakes and interior rivers was increasing. Railways were preeminently passenger lines. Before 1850 railways in the East had begun to compete with the waterways, but, so far as they existed at all in the West, they were feeders to the water lines. Competition with the waterways of the Mississippi Valley came from the water route formed by the Hudson, Erie Canal, and Lakes, with the cooperation of short railway feeders. But in the decade 1850-1860 railways made a good beginning toward the assumption of that competitive relationship which was soon to prove so disastrous to the water lines. In some instances the competition by 1860 had become so serious as to endanger the existence of river traffic.

^a Monthly Summary of Commerce and Finance, January, 1900.



DECLINE OF RIVER COMMERCE AFTER 1860.

I.

THE WAR AND THE RAILWAYS.

The war served at once to close all southern ports to commerce, and destroyed the greater part of the river trade. Steamboats continued to a small extent to ply the waters of the upper Mississippi and the Ohio, but through traffic southward ceased altogether. Railway building continued. The rail lines which most seriously threatened river commerce were located north of the Ohio, and were undisturbed by military operations. Although hampered by lack of capital, extension of lines was not wholly checked, and the progress in railway building made during the time of disturbance was sufficient to increase materially their competitive power. Bridges across the Mississippi and Ohio were authorized by Congress in 1866, and the connections between the two banks of the river were soon thereafter made. The building of the Union Pacific gave an added impetus to the westward moving railways, all of which were eager for this transcontinental connection. The Union Pacific was opened in 1869. In 1867 the Chicago and Northwestern and the Chicago, Burlington and Quincy controlled lines reaching to the Missouri River. In 1869 the Chicago, Rock Island and Pacific was running through trains from Davenport to Council Bluffs, and early in 1870 the Illinois Central was operating under lease a line from Dubuque to Sioux City. In 1867 a line was completed from Milwaukee to St. Paul via Prairie du Chien. The Pacific Railroad of Missouri was completed from St. Louis to Kansas City in 1865. Farther south, where the ravages of war were more severe, progress was naturally slower. Mobile and New Orleans were united by rail in 1870, and in 1874 a continuous line had been formed from Chicago to New Orleans paralleling the Mississippi by the extension northward to join the Illinois Central at Cairo of the New Orleans, Jackson and Great Northern and the Mississippi Central.

The following table shows the growth in railway mileage from 1851 to 1868 in the States bordering the rivers. It will be observed that in all except the Southern States there was railway building during the war period, and that in some cases, notably Illinois, Iowa, and Ohio, the progress from 1860 to 1865 was remarkable.

Total number of miles of railway in designated States, 1851-1868.

State.	1851.	1855.	1860.	1865.	1868.
Ohio.....	638	1,486	2,946	3,331	3,398
Indiana.....	86	1,406	2,163	2,217	2,600
Illinois.....	116	887	2,790	3,157	3,440
Minnesota.....				213	572
Wisconsin.....		187	905	1,010	1,235
Iowa.....		68	655	891	1,523
Missouri.....		139	817	925	1,354
Kentucky.....	93	242	534	567	813
Tennessee.....		466	1,253	1,296	1,436
Arkansas.....			38	38	86
Mississippi.....	60	278	862	898	898
Louisiana.....	50	203	335	335	335
Kansas.....				40	648
Nebraska.....				122	920

During this period of waterway inactivity the railways were not only extending their lines, but they were making more efficient their existing facilities. Consolidation of connecting lines into single systems for the purpose of increasing the efficiency of long-distance operation was proceeding rapidly. In the sixties appeared the first of the fast freight lines, which facilitated enormously the handling of through business from the West. Cooperation of railways in the construction of union stations, connecting tracks, and similar facilities increased in the decade 1860 to 1870. It is interesting to observe that one of the causes assigned for the building of cars by shippers was the fear of the railways that the restoration of river business after the war would have such a serious effect upon their business that it would be unwise for them to make the necessary outlay themselves. The fact that northern agricultural production actually increased during the war^a and that there was a growing demand in Europe for our breadstuffs were favoring conditions. Shippers became accustomed to the new transportation agency. They found it more efficient, and it relieved them of the burden of marine insurance. In short, business relationships were established which carried over after the waterways were again available, and, except at certain periods when circumstances were exceptional, the rivers did not even approach their former position of importance.

The consolidation of connecting railway links had given the eastern trunk lines control of their western connections, and with it the power to reach out to the source of traffic and control its transit. By the end of the sixties, the railways had gained a considerable degree of confidence in their ability to compete with western rivers and lakes. In 1869 it was said that grain could be moved by rail from St. Louis to the north Atlantic seaboard for a much smaller sum than the usual rate for carrying it from St. Louis by steamboat to New Orleans. In 1872 the railways carried to market 83 per cent of the grain and provisions of the West.^b The overland movement in cotton, which had amounted in 1852 to only 175 bales, reached 109,000 bales in 1860, 350,000 in 1870, and 1,134,000 in 1880. When business was resumed on the river in 1865 the Cincinnati Price-Current estimated the decline in the shipment of western produce south by river at from 75 to 90 per cent, the produce still

^aShipments of flour and grain from Chicago east increased from 31,000,000 bushels in 1860 to 55,000,000 bushels in 1863. See table, p. 35.

^bKingwall, *op. cit.*, p. 491.

shipped in this manner being for local consumption only. The diversion of commerce from river to rail at St. Louis was aided by the fact that in river traffic transfers at this point were necessary. Because of the shallowness of the upper river, vessels of much less draft operated above the city than below. Because of this break in shipment, the railways found their opportunity to step in and take the business.

Passengers naturally sought the more rapid means of travel, and the passenger steamboat, which had played such a part in the settlement of the West, began after the war to diminish in importance. Passenger transportation is now confined to excursion trips southward in the winter and northward in the summer, and to ferry and short-distance local service. Steamboats have since 1860 been constructed with special reference to the carrying of freight. Since the war, also, has appeared on a larger scale the towboat, or propelling steamer, built with powerful engines, stern wheel, and shallow draft, to handle the tows of barges, flats, or rafts. It has been a factor in the development of the coal trade of the Ohio River, it played a necessary part in the development of the barge line between St. Louis and New Orleans, and it has been and is still regularly engaged in the declining rafting operations of the upper Mississippi. Its stern wheel gives it peculiar facility in backing and turning and in handling its tows and rafts successfully around the innumerable sharp bends in the rivers. The barge became employed extensively as a freight carrier, because the shallow depth of the rivers made a development of steamboat capacity with vessels of deep draft an impossibility. It was necessary to devise a shallow craft which could spread out over the water and which could be loaded above the water line rather than below decks. By this change in transportation methods a very great reduction in cost was obtained.

With the exception of the civil war, there was probably no single influence which played so large a part in diverting traffic from the lower Mississippi to the railways as the condition of the mouth of the river. So long as exports from New Orleans were carried in clipper ships with sharp keels which drew when loaded not more than 16 to 18 feet, there was a reasonable probability that they could get over the bar in Southwest Pass with the aid of towboats. Doubtless the poor channel diverted some commerce from this port, yet the demand for cotton abroad led vessels to make special effort to reach New Orleans, and commerce at this port continued to grow. But with a change in build and size of shipping seeking the port, the shallow entrance became impracticable. When there was added to this the unreasonable charges and the arbitrary regulations of a monopolized towboat company, the situation became intolerable. It was not relieved until 1877, when the Eads jetties at South Pass were completed. Towing charges and insurance rates both fell at once, and the dangers of stranding and the costs of delay were no longer to be feared. There have been other physical difficulties also in the way of the development of lower Mississippi commerce. Aside from those due to a shifting channel and the presence of snags, ice and low water have been constant hindrances. Between St. Louis and Cairo, navigation has been regularly suspended for a greater or less time each year because of ice. The average number of days of interruption per year for the ten years 1871 to 1880 was thirty-five. A

more serious interference over this same stretch has been the frequent low water, due both to lack of water supply and to the sediment brought down by the Missouri. The full advantages of river commerce can not be attained unless boats which draw 8 feet of water when loaded can be employed. At times vessels drawing only 4 feet could alone be used at what is estimated to have been double the cost. The Select Committee of the Senate on Transportation Routes to the Seaboard found that during the nine years 1865 to 1873 the average number of days in which the water was less than 8 feet was one hundred and fifty nine. For the ten years 1871 to 1880 the average was one hundred and twenty-six days. From 1900 to 1909, however, dredges have continuously maintained an 8-foot depth during the navigation season. Below Cairo a 9-foot navigation is seldom obstructed by either ice or low water. The frequently reiterated charge that certain kinds of products were injured by the climate of New Orleans, and that this had led to a diversion of traffic eastward, was investigated by the Select Committee on Transportation Routes to the Seaboard in 1874, and found to have no legitimate basis except, possibly, to some slight extent in the case of corn.

The passage of the interstate-commerce act in 1887 aroused the well-nigh forlorn hope of the steamboat interests. These interests, as a rule, had not been able to raise their rates because of the sharp competition of individual steamboat owners. They had watched the railways lower their rates at competitive water points until they had taken the business, and then, to some extent, at any rate, recoup themselves by higher exactions from shippers at inland points which had no water facilities. The interstate-commerce law forbade discrimination, and complaints were promptly presented to the commission with reference to the river situation. But two months after the passage of the act the commission rendered a decision in the petition of the Louisville and Nashville Railroad and others, relieving the roads from the necessity of conforming to the long and short haul clause where water competition was present. With this decision went the last hope of the steamboat men that they could maintain themselves against the superior service of the railways, and orders for new steamboats, which had been held up awaiting the commission's action, were canceled.

II.

OHIO RIVER COMMERCE.

As the Ohio River Valley had earliest developed its waterway as an efficient transportation agency, so it was the first to be influenced by the extension of railways. By 1875 the four leading east and west trunk lines with western connections at Chicago, St. Louis, Louisville, and Cincinnati had become the important commercial highways, and had greatly influenced the course of trade in the States south of the Ohio and of Missouri. The commercial centers of this section were now St. Louis, Louisville, and Cincinnati, in competition with Mobile, New Orleans, and Galveston. The three former drew their supplies principally from Atlantic seaports. By 1880 Cincinnati had realized the futility of the waterway as an aid in the competitive struggle, and in that year had completed her Cincinnati Southern Railway to Chattanooga with the purpose of securing a grip on southern territory.

Competition between the two forms of transportation had a steadying effect upon water rates. The river rates had earlier been determined wholly by the supply of and demand for transportation, and this had been influenced greatly by the condition of navigation. But by 1870 it appeared that an enhancement of the water rate during a season of low water had a tendency to divert traffic to the railway, and that the boats could therefore no longer enjoy the full benefit of their situation. To some extent, agreements for prorating on through traffic were entered into between rail and water lines. For example, the Chesapeake and Ohio prorated with Ohio steamboats on an allowance of two miles of waterways for one of rail. These agreements, however, were difficult to arrange and to keep in force because of the lack of boating organization and the necessity of making contracts with so many individual steamboat owners. Nevertheless, prorating arrangements between railways and the packets operating on the Ohio for the purpose largely of handling Pittsburg steel products continued until about 1900, when they were terminated in response to the desire of railways serving the Pittsburg district.^a

The gradual absorption of the general merchandise traffic of this whole section by the railways may be illustrated in the commercial development of Cincinnati. The trade of this city was until about 1860 chiefly dependent upon the Ohio River and its connections, except for that portion of its products which went north by canal and the Lakes. The outbreak of the war arrested the commerce of Cincinnati, and the diversion of traffic to the railways, following upon the restoration of normal industrial conditions, not only made Louisville and St. Louis more active competitors of Cincinnati than before, but also brought Chicago into the field as a powerful rival. The river trade was inactive from 1861 to 1872, the down-river traffic below Louisville being limited by the capacity of the Louisville and Portland Canal, which admitted only boats of a maximum capacity of 600 to 700 tons. In that year, however, the enlarged canal was completed. Two years later the tolls were reduced and in 1880 were abolished altogether. These improvements made possible the employment of boats of 1,700 tons upon an unimpeded river and gave some impulse to river commerce. But so rapidly did traffic on the Ohio decline that by 1887 there was but one regular steamboat line between Cincinnati and New Orleans. No boats ran from New Orleans to the Cumberland and Tennessee rivers, and there was no regular Louisville boat.

The following table of Cincinnati exports shows the steadily increasing preponderance of rail traffic:

Exports from Cincinnati, 1855-1880, b

Year ending August 31	Shipped by river.	Shipped by rail and canal.
1855.....	\$20,733,234	\$18,044,160
1865.....	77,498,017	116,292,294
1875.....	43,832,099	157,571,924
1880.....	45,537,667	208,289,600

^a Report of Commissioner of Corporations on Transportation by Water, Part II.

^b Report on Internal Commerce of the United States, 1880.

The shipments by canal were a small and declining amount, and the large proportion of shipments shown in the second column were handled by the railways.

The same tendency may be also illustrated by a table of steamboat arrivals at Cincinnati for a series of years.

Number of arrivals of steamboats at Cincinnati, 1848-1880.

Year.	From New Orleans.	From Pittsburg.	From St. Louis.	From other ports.	Total.
1848.....	319	880	292	2,499	3,780
1855.....	159	407	210	1,809	2,585
1860.....	185	330	206	2,264	2,985
1865.....	41	211	111	3,127	3,490
1870.....	107	151	115	2,339	2,712
1875.....	71	62	27	2,442	2,602
1880.....	103	182	93	2,785	3,163

The only arrivals in which there has not been a sharp decline are those from "other ports," which consist, principally, of local and ferry service.

The following table gives the steamboat traffic out of Cincinnati for the years 1855 and 1905, and shows its change in character and its marked decline. The comparison is disturbed, but not wholly destroyed, by the variety of units of measure employed:

Principal shipments by river from Cincinnati, 1855 and 1905.

[Compiled from reports of Cincinnati Chamber of Commerce and Merchants' Exchange.]

Article.	1855.	1905.
Ale, beer, and porter.....	barrels.....	9,523
Alcohol.....	do.....	19,956
Apples, green.....	do.....	3,427
Beef.....	do.....	17,584
Do.....	tierces.....	13,977
Beans.....	barrels.....	1,297
Brooms.....	dozens.....	18,275
Butter.....	barrels.....	1,300
Do.....	tubs.....	440
Do.....	firkins, kegs.....	24,196
Butterine.....	pounds.....	56,630
Bran, etc.....	sacks.....	11,456
Bagging.....	pieces.....	2,185
Cattle.....	head.....	10,285
Candles.....	boxes.....	131,191
Castings.....	pieces.....	80,263
Do.....	tons.....	2,073
Cement and plaster.....	barrels.....	3,591
Cheese.....	casks.....	4
Do.....	boxes.....	102,352
Coffee.....	bags.....	10,079
Do.....	sacks.....	42,283
Cooperage.....	pieces.....	108,105
Corn.....	bushels.....	11,083
Do.....	sacks.....	8,042
Corn meal.....	barrels.....	64,344
Cotton.....	bales.....	2,772
Crockery.....	packages, cases, etc.....	10,021
Eggs.....	barrels.....	127
Do.....	cases.....	2,846
Feathers.....	sacks.....	5,014
Do.....	pounds.....	7,319
Flour.....	barrels.....	3,300
Fruit, dried.....	pounds.....	199,276
Do.....	bushels.....	6,663
Fresh meats.....	pounds.....	13,029
Furniture.....	packages.....	11,400
		17,723

Principal shipments by river from Cincinnati, 1855 and 1905—Continued.

Article.	1855.	1905.
Glass, window.....	boxes.....	1,872
Glassware.....	packages.....	37,092
Hardware.....	do.....	30,845
Grease.....	barrels.....	9,413
Hay.....	tons.....	159
Do.....	bales.....	5,706
Hemp.....	do.....	2,918
Hides.....	number.....	24,427
Do.....	pounds.....	44,035
Horses.....	head.....	1,630
Hogs.....	do.....	1,384
Hog products:		331
Bacon.....	pounds.....	524,215
Hams.....	do.....	329,310
Dry salted meals—		
Loose.....	do.....	40,900
In boxes.....	do.....	1,056,500
Lard.....	do.....	1,000,037
Do.....	barrels.....	43,799
Do.....	kegs.....	62,806
Pork.....	barrels.....	103
Do.....	butk.....	875,054
Pork and bacon.....	hogsheads.....	42,469
Do.....	tierces.....	40,515
Do.....	barrels.....	104,275
Do.....	boxes.....	22,574
Lard oil.....	barrels.....	43,395
Iron.....	pieces.....	604,861
Do.....	bundles.....	63,716
Do.....	tons.....	11,978
Leather.....	bundles.....	^a 1,509
Linseed oil.....	barrels.....	2,170
Lumber.....	square feet.....	75,000
Manufactures, sundry.....	pieces.....	5,228
Merchandise, sundry.....	tons.....	16,656
Do.....	packages.....	811,625
Molasses.....	barrels.....	45,150
Nails.....	kegs.....	431
Oil cake.....	tons.....	5,399
Oats.....	sacks.....	778
Do.....	bushels.....	42,282
Oil.....	barrels.....	9,969
Potatoes.....	do.....	5,394
Do.....	bushels.....	10,399
Petroleum.....	barrels.....	18,025
Produce, sundry.....	packages.....	979
Rice.....	barrels.....	141,925
Rye.....	bushels.....	588
Rope, twine, etc.....	packages.....	2,760
Shoes and boots.....	cases.....	3,909
Salt.....	barrels.....	12,944
Do.....	sacks.....	36,333
Seed:		7,576
Clover and timothy.....	bags.....	9,606
Grass.....	barrels.....	4,577
Flax.....	do.....	7,330
Do.....	head.....	1,121
Sheep.....	boxes.....	1,650
Soap.....	hogsheads.....	651
Sugar.....	barrels.....	34,217
Do.....	barrels.....	32,432
Starch.....	boxes.....	3,693
Sundry liquors.....	barrels.....	24,520
Tallow.....	do.....	25,714
Tobacco.....	kegs and boxes.....	6,893
Do.....	hogsheads.....	26,077
Do.....	bales.....	4,968
Tobacco leaf.....	hogsheads.....	3,307
Do.....	cases and bales.....	4,186
Tobacco, manufactured.....	packages.....	48
Vinegar.....	barrels.....	2,158
Wheat.....	bushels.....	8,643
Whisky.....	barrels.....	8,258
Wool.....	bales.....	243,551
Do.....	pounds.....	13,914
White lead.....	kegs.....	6,435
Wines and liquors.....	barrels.....	4,482
Do.....	boxes and baskets.....	55,218
		1,266
		11,437

^a Iron and steel.

The commodity predominant in Ohio River commerce, in fact the only commodity of importance now transported on the Mississippi River system, is bituminous coal. For over twenty-five years this has far surpassed all other commodities in tons carried. For the sixteen years 1886 to 1902 the total amount of freight carried through the Louisville and Portland Canal was about 31,000,000 tons, of which nearly 75 per cent was coal.

Transportation of this commodity began very early in the nineteenth century with the aid of the flatboat already described. But the dangers of the upper Ohio in a "rise" and the difficulties of navigation in low water made the floating of coal flats too precarious to be profitable. Ohio River coal handling assumed importance about 1850, when steam towing or, better, propelling was permanently introduced, and the business was extended beyond the Ohio River itself as far as New Orleans. This traffic on the Monongahela has steadily increased because of the extraordinary cheapness with which it can be handled, and it alone has saved river commerce in this section from destruction. While the size of craft employed and the efficiency of propelling steamboats have been increased, there has been no fundamental change in the method of handling the traffic during the last quarter century. There are three typical craft employed, which are, in the order of size, the coal boat, the barge, and the flat or float. The coal boat, drawing 10 feet of water, has a capacity of over 1,000 tons or 25,000 bushels. It costs about \$800, and was formerly commonly sold with its cargo at destination. The barge, with a little less draft, has about half the capacity of the boat, but is better built, costs about \$1,000, and is returned empty for reloading. This is used more commonly in the trade which does not extend beyond Cairo or St. Louis. The float or flat is a still smaller craft, of about 200 tons or 5,000 bushels capacity, drawing about 4 feet, and costing \$400. This fragile craft has also commonly been broken up at the end of its voyage. These three kinds of floating equipment, together with fuel boats and the steam towboat, constitute the fleet.

The method of handling as the fleet proceeds downstream is simply that of a progressive accumulation of units into larger aggregates, as navigation grows more reliable. The origin of the traffic is on the Monongahela River, where the coal is now loaded mechanically from the mines into the barges. However, the coal has always been in sufficiently close proximity to the waterway to make water handling profitable, even before the introduction of mechanical aids. At the beginning of the coal business, flats and rafts were floated down the river at high and medium stages of water. The river was first improved by a private company, incorporated by the State of Pennsylvania in 1836, whose works were acquired by the United States in 1897. The river is now navigable by means of locks to Fairmont, W. Va., 131 miles above Pittsburg. Coal is propelled down this river in small tows to Pittsburg Harbor where the boats and barges are moored awaiting a favorable stage of water, when they are sent in large aggregates to points below on the Ohio and Mississippi. Fleets of 25 boats, barges, and flats containing 350,000 to 500,000 bushels of coal are now handled from Pittsburg to Louisville. There they are moored above the falls of the Ohio at Jeffersonville, Ind., are towed in sections through the Louisville and

Portland Canal, or entire over the falls as the stage of water determines, and are reassembled below the falls into still larger fleets for the final stretch of their journey. One of the largest fleets recorded carried from below the falls 56,000 tons, or 1,400,000 bushels of coal.

The rapid increase in this traffic in the eighties was due, so far as southern demand was concerned, partly to the rapid growth of manufacturing at New Orleans and other Louisiana and Mississippi points reached by the river and its tributaries, and partly to the demand for coal in the Louisiana sugar houses. Nine-tenths of the Louisiana sugar plantations were then on the bank of some stream, and coal could be delivered to them directly by water in these shallow barges. This coal is still used by the sugar and rice mills of Louisiana. It is also in demand in the gas, domestic, and steam coal trade of New Orleans, by coastwise and ocean steamships, and by railway locomotives. None of it is used at any distance from the river bank; none is sent for sale to domestic ports beyond New Orleans. Of the total annual receipts at New Orleans of about 1,000,000 tons, about 500,000 tons are used by ocean steamships, and about 400,000 tons are unloaded on the west bank of the river largely for railway use.

Coal is now landed to some extent at important points along the river system, such as Cincinnati, Louisville, Memphis, Vicksburg, Natchez, and Baton Rouge. Moreover, the coal barge furnishes a most satisfactory and economical method of providing the river steamers with fuel. The old picturesque method of "wooding up" disappeared with the exhaustion of the wood supply, and barges of coal are now moored to the river banks at designated points. These the steamers pick up, unload while in motion, and then moor again to the bank, where they are afterwards collected by the towboats and assembled for the return trip to Pittsburg. With the exhaustion of the timber supply of the Allegheny River, and the necessity of obtaining lumber from the Pacific coast, the coal barges are being returned to the mines in larger numbers, and less of them are being sold with the cargo.

The perfecting of this method of coal transportation has kept always in mind as the one object the attainment of the greatest possible economy of service. This has been accomplished by the use of propelling boats which do not attempt to make great speed, but which have the power to guide the huge unwieldy fleet of barges safely to their destination, and also by the method of spreading out the cargo over a wide area by means of craft as shallow as possible, in order to minimize low-water difficulties. As a result, coal is carried from Pittsburg to New Orleans at a little less than half of 1 mill per ton-mile, a rate which is quite beyond the reach of railway competition.^a The development of the upper river business in coal may be shown, approximately, by the following table, which gives for the years 1844 to 1886 the number of bushels of coal and slack shipped from the Monongahela according to the books of the Monongahela Navigation Company, and from 1890 to 1907 the number of bushels passed through the locks of the Monongahela River, as shown by official reports.

^a In view of the fact that the same corporation owns the mine, the loading and unloading facilities, the boats and barges, and to some extent the wharves, this rate is a mere matter of bookkeeping, and too much reliance should not be placed upon it.

Coal and slack shipped from the pools of the Monongahela slack water, 1844-1885.^a

	Bushels.
1844.....	737, 150
1850.....	12, 297, 967
1855.....	22, 234, 009
1860.....	37, 947, 732
1865.....	39, 522, 792
1870.....	57, 596, 400
1875.....	63, 707, 500
1880.....	84, 048, 350
1885.....	82, 459, 050

Movement of coal through Monongahela River locks, 1890-1907.^b

1890.....	116, 302, 600
1895.....	104, 589, 900
1900.....	145, 446, 575
1905.....	212, 233, 500
1907.....	257, 086, 500

It is unnecessary to follow statistically the water traffic in coal from port to port down the river, but the following summary of the business of 1907 is illuminating. In that year there passed through Lock No. 3 on the Monongahela River, which is approximately the total coal traffic at its origin, 8,957,712 short tons. There was received in the Pittsburg district in this year from the Monongahela locks 6,840,816 tons, a small portion of this being mined within the pools between the locks, and hence not included in the first figure. There passed Davis Island Dam on the way down the river 2,883,965 tons. There was received at Cincinnati from the Monongahela River 1,244,720 tons, and a slightly smaller quantity from the Kanawha and other river sources. Through the Louisville and Portland Canal and over the falls of the Ohio at Louisville, there passed 1,154,991 tons on their way to destinations farther south. The receipts by river of coal at New Orleans are estimated at about 1,000,000 tons per year.

While the coal traffic has steadily grown, as already indicated, the growth during the last ten years has been almost wholly in the section between the mines and Pittsburg and Cincinnati. Below Cincinnati there has been no marked change in river traffic during this decade. Moreover, it is not to be assumed that this product is handled exclusively or even predominantly by water. For example, of the total coal shipped into and through the Pittsburg district during the years 1900 to 1906, the railways handled an average of 71 per cent and the waterways 29 per cent. For the Pittsburg district alone, however, a larger proportion has always been received by water. In 1906 the proportion carried by water to Pittsburg was 57 per cent, while to the territory west of Pittsburg it was only 11 per cent. At Cincinnati, where the receipts consist almost wholly of bituminous coal from the Monongahela and Kanawha rivers, the proportion of coal received by river fell from 93 per cent in 1880 to 60 per cent in 1895 and 33 per cent in 1906. Of the total shipments out of Cincinnati in 1906 only about 6 per cent went by river. It is impracticable to ship coal in any quantity by water to St. Louis, and only a small amount, used for gas-making purposes, is brought in from Pittsburg by river.

^a Report on Internal Commerce of the United States, 1887.

^b Monthly Summary of Commerce and Finance.

Passing from coal to other important sources of traffic, a brief summary of the report of the Commissioner of Corporations on Transportation by Water in the United States will suffice to present the existing situation. Of the traffic above Pittsburg, that on the Allegheny is reduced to bulk freight, as railways parallel the river and handle general merchandise. This freight consists principally of lumber, a rapidly decreasing quantity, rafted downstream, coal carried a short distance upstream for the use of steel mills, and gravel, sand, and stone dredged along the river and carried to points in Pittsburg Harbor. The total traffic amounted to about 2,500,000 tons in 1906. The Monongahela is likewise paralleled by railway lines, which take care of the merchandise business. Of the traffic outside of coal, the only products of importance are sand and gravel, of which the predominant movement is upstream. Coal constituted 84 per cent of the traffic in 1907 and sand and gravel nearly 15 per cent. Of the commerce of Pittsburg Harbor in 1907, 75 per cent consisted of coal and 22 per cent of sand and gravel. Small shipments of iron and steel products still take place. Of the total commerce up and down stream at Davis Island Dam below Pittsburg in 1907, 80 per cent was coal. Sand was next in order, with 17 per cent of the total tonnage. At Wheeling the total receipts and shipments by river for the year 1906 amounted to only 161,550 tons, mostly general merchandise. The Muskingum River has a small miscellaneous traffic of little importance. Down the Little Kanawha are floated saw logs and railroad ties, which nearly absorb the entire tonnage. The total traffic of this river does not reach 100,000 tons annually. Of the traffic of the Kanawha, nearly 90 per cent in 1906 consisted of coal shipped almost wholly to Cincinnati. Timber and railroad ties are the other products of importance. The Big Sandy River had a traffic in 1906 of 205,452 tons, of which 94 per cent consisted of timber and ties. The Census Report on Transportation by Water in 1906 shows river receipts at Cincinnati of 2,131,847 tons and shipments of 231,368 tons. Some traffic is found on the Kentucky River, consisting principally of lumber and loose logs, and to some extent of coal, but the total amount is not large. At Louisville, according to the Census Report on Transportation by Water in 1906, the river receipts were 1,116,955 tons and the shipments 86,772 tons. Coal constituted more than half of the receipts, stone and sand being important items.

Through the Louisville and Portland Canal and by way of the open river in good stages of water the river traffic moves southward. Of the total tonnage passing Louisville by these two avenues in 1907, 88 per cent was coal. The other items of sufficient importance to be separately mentioned were iron ore, manufactured iron, and lumber. At Evansville, according to the Census Report on Transportation by Water in 1906, the river receipts, consisting principally of coal and lumber, amounted to 358,371 tons and the shipments to 57,762 tons. The Green and Barren rivers have a small tonnage, composed largely of timber and ties and some coal. The Cumberland River, although navigable for 500 miles, has a total tonnage not to exceed 600,000 tons, consisting largely of forest products, especially railroad ties. The Tennessee, navigable in the main river for 1,300 miles, had a tonnage in 1906 of 1,578,760 tons, consisting principally of iron ore and sand transported locally.

The census figures show a total traffic on the Ohio system of 15,797,000 tons in 1889 and of 15,227,000 tons in 1906. The decline in miscellaneous traffic and in lumber is offset by the increase in coal movement, so that according to the report of the Commissioner of Corporations on Transportation by Water in the United States the volume of traffic, with lumber, sand, and coal included, seems to have increased to some extent. But the striking characteristic of the commerce of this valley is the comparative lack of through business to the lower Mississippi which characterized it during the first seventy years of the nineteenth century. With the exception of coal and to a slight extent lumber, commerce is now confined to short-distance movements between local points. In spite of the fact that along the Ohio River between Pittsburg and Cairo there are forty railway crossings or terminals, this local traffic reaches back but a few miles from the river bank. Traffic requiring transfer and a rail haul of any considerable distance no longer makes any use of the river, but is handled the entire distance by rail.

III.

UPPER MISSISSIPPI COMMERCE.

It will be recalled that previous to the civil war the upper Mississippi was the sole highway into the Northwest and that freight and passenger traffic by water developed extensively. After railways reached the river in 1854 and 1855, close relations were established between rail and river, and pioneers and their supplies traveled by this avenue to their destination. But after the war the upper river was soon paralleled by railways, and lines were also extended northwestward from Chicago and Milwaukee direct to Minnesota and Wisconsin river points. This promptly put an end to the steamboat passenger business and began the transformation of the freight traffic into a purely local trade.

Moreover, these railway lines tapping the river at so many points served as efficient distributing agencies for traffic brought down the river by steamboats, and this had its influence toward the destruction of through river trade. For example, of the southbound river tonnage which passed the bridge at Dubuque in 1878 more than half was stopped at Fulton and Rock Island and transferred to railways for shipment to Chicago.^a

The building of railways west of the river already described had brought that vast territory almost completely into subjection to rail transportation. By 1879 seven-eighths of the surplus products of the trans-Mississippi States north of Arkansas crossed the Mississippi River on railways at St. Louis or between that city and St. Paul, and was transported East to local or foreign markets. Only 608,555 tons were moved south by river in 1878, as compared with 4,583,844 tons moved east by rail by way of St. Louis and points north, from the territory west of the Mississippi. During 1878 the eastward shipments from St. Louis by rail exceeded the southern shipments from that city by river.^a

^a Report on Internal Commerce of the United States, 1879.

This tendency to divert traffic from the waterway was accentuated by the long suspension of upper Mississippi navigation during the winter months, by the variations of the stage of water, and by the lack of facilities for adequate mechanical and commercial handling of products at river points. It was not surprising that sellers of western produce should prefer to send their shipments to Chicago rather than to some river town which had no wharves or docks, no warehouses, no unloading machinery, and no credit or banking facilities beyond what was necessary to meet a narrow local demand. Not only in floating equipment on the rivers, but in all mechanical aids and in all the various devices of organization that assist commercial exchange, the river system was totally lacking. In 1880 there were 13 railway bridges between St. Paul and St. Louis, and not a city with commercial power sufficient to divert traffic from its eastward course. Products once loaded in trains west of the Mississippi proceeded direct to Chicago and other large commercial centers, and water traffic declined.

The character of the traffic on the Mississippi and its tributaries during the ten years after the close of the war changed materially. As already noted, upper Mississippi River traffic, except lumber, to be later discussed, had been largely diverted from its southward course. On the lower Mississippi what remained to the steamboats consisted to a large degree of the lower classes of freight carried locally from point to point along the river. This traffic the railways had not cared to struggle for, but higher classes of freight from river towns, and practically all freight from the important interior centers in States south of Missouri and the Ohio River, were now moved their entire distance by rail.

It would hardly be worth while to trace in detail the decline in general-merchandise traffic, which began about 1870. Railway lines were extended on both banks of the river and at a distance back from the water, and were in a position to control all the merchandise traffic which they cared to handle. On the upper Mississippi, because of the uncertainty and brevity of the navigation season, water carriage has not to any great degree affected rail charges. Farther south, however, the railways have made special rates to divert river business.

General-merchandise traffic on the upper river is now wholly confined to the trading of small steamers between local points, except for such traffic as is handled by one passenger line between St. Louis and St. Paul, which is operated largely for excursion purposes. No one of the formerly important river towns, such as Burlington, Quincy, Alton, Davenport, Rock Island, Clinton, Dubuque, LaCrosse, and Winona, has any considerable river traffic to-day. As already stated, grain was carried before the war during the prosperous days of steamboating to the maximum capacity of the boats. This continued in diminishing quantities into the decade 1880-1890, some of it being transshipped by the barge line from St. Louis to New Orleans. But this has now ceased altogether. Wheat raised near enough to the river to make water handling possible and profitable is now consumed almost wholly by local mills. Conditions of navigation have discouraged flour shippers and that trade is at an end. Barge trade in merchandise freight does not exist on the upper Mississippi. According to the Census Report on Transportation by Water in 1906, the total

receipts and shipments of the upper Mississippi, exclusive of logs and rafts, amounted to 1,193,010 tons, of which 728,000 tons were stone and sand.

The growth of railway traffic in this section coincident with the decline of river traffic is shown by a comparison of business done in 1870 and 1880 by railways serving the Mississippi Valley, some of them paralleling the river, others crossing it.

Table showing tons of freight carried and tons of freight carried 1 mile by certain western railways, 1870 and 1880.

Name of railway.	Tons of freight carried.		Tons of freight carried 1 mile.	
	1870.	1880.	1870.	1880.
Chicago and Alton.....	1,261,432	3,071,788	145,000,000	484,474,730
Chicago, Burlington and Quincy.....	1,052,754	6,039,186	147,409,207	1,024,401,793
Chicago, Milwaukee and St. Paul.....	1,522,753	3,200,353	181,428,573	504,876,154
Chicago and Northwestern.....	2,222,978	5,574,135	304,747,240	865,909,542
Chicago and Rock Island.....	856,048	2,906,763	130,083,871	686,458,954
Illinois Central.....	1,023,904	2,703,582	205,409,400	381,288,400
Hannibal and St. Joseph.....	411,831	716,739	70,858,854	120,065,740
Ohio and Mississippi.....	528,702	^a 1,284,254		

^a For the year 1876.

The traffic which during the most of this period used the upper river to the exclusion of the railway was that of logs and lumber of various kinds, which were floated loosely in the upper tributaries and then converted into rafts and propelled downstream to various points between St. Paul and St. Louis. Most of this traffic originated on the Wisconsin rivers, the St. Croix and Chippewa principally. Lumbering was carried on during the winter months, when snow made transportation for short distances to the rivers easy. In the spring, with the break-up of the ice, the logs were floated down these streams, and when they reached the navigable river, where guidance through the bridges was necessary, they were taken in charge by towboats. Every town of any size from St. Paul to St. Louis was either a lumber manufacturing and distributing point for the logs delivered to them or a mere distributing center for the rafts of laths, shingles, and various forms of manufactured lumber brought down from the mills on the upper river and tributaries. As early as 1876 there were 73 mills in operation on the main river between St. Paul and St. Louis.^a Supplies of lumber were shipped from these points by rail from 10 to 100 miles east of the river, and from 500 to 1,000 miles west.

But even this source of traffic has been slowly slipping away. Whereas in 1876 there were 100 raft boats engaged in towing logs and lumber on the upper Mississippi, in 1906 there were only 20. Statistics of the amount of white pine now floated on the river are not available, but the estimated number of feet of logs, lumber, and shingles transported is here given for a series of years up to 1891. The wide variations in different years are due to conditions of navigation.

^a Report on Internal Commerce of the United States, 1887.

Number of feet of white pine floated on the upper Mississippi River (estimated).

	Feet b. m.
1875.....	1, 060, 000, 000
1876.....	1, 350, 000, 000
1878.....	1, 153, 000, 000
1880.....	2, 000, 000, 000
1886.....	1, 315, 000, 000
1891.....	1, 210, 000, 000

The decline in this form of traffic is due in part to the conditions of navigation. Actual low water, the uncertainty of an adequate stage of water, and the delays due to log jams have diverted much traffic to the railways. It is doubtful, however, whether the short navigation season of Wisconsin and Minnesota has had any great influence, for the winter season has been admirably adapted for the primary lumbering operation. The most important cause of decline has been the exhaustion of the lumber supply along the river courses, making it more feasible either to ship logs by rail to the mills or to move the mills into the forests and ship out by rail the manufactured lumber. Capital for lumber manufacturing has for a decade been leaving the Mississippi Valley and engaging in southern and Pacific coast operations.

The following table presents the traffic through the government canal around the Des Moines and Keokuk Rapids from its opening in 1877 down to the present time. While different kinds of traffic vary in amount from year to year in accordance with conditions affecting the particular industry, and while the canal statistics do not show the entire traffic except in seasons when the water was too low for passage through the rapids, nevertheless a survey of the facts for the entire period shows strikingly the decline in the commerce of this section of the river.

Traffic through the Des Moines Rapids Canal for a series of years from its opening in 1877.

[Compiled from reports of United States engineers.]

Year ending June 30 -	Steam-boats.	Barges.	Passengers.	General merchandise.	Grain.
				<i>Tons.</i>	<i>Bushels.</i>
1878.....	670	348		53,346	737,415
1879.....	802	454	5,008	64,658	2,192,642
1880.....	967	651	13,231	78,980	2,147,469
1881.....	840	276	10,003	44,942	1,151,032
1882.....	700	444	8,588	29,043	781,817
1883.....	1,107	705	9,192	43,359	724,174
1884.....	913	245	13,057	54,245	470,580
1885.....	889	169	13,065	54,120	771,432
1886.....	784	218	22,221	56,001	455,081
1887.....	990	318	20,797	52,815	366,432
1888.....	795	245	8,330	33,160	113,037
1889.....	1,022	288	22,880	50,018	381,559
1890.....	924	477	14,529	71,453	397,788
1894.....	619	312	11,752	43,182	83,650
1895.....	606	310	11,111	22,035	55,729
1900.....	882	381	27,488	25,105	6,902
1905.....	928	285	33,906	14,451	3,790
1906.....	816	644	38,005	14,048	24,835
1907.....	999	141	48,825	13,849	12,271

Traffic through the Des Moines Rapids Canal for a series of years from its opening in 1877—Continued.

Year ending June 30—	Logs.	Lumber.	Laths.	Shingles.
	<i>Feet</i>	<i>Feet b. m.</i>	<i>Number.</i>	<i>Number.</i>
1878		25,000,000	4,000,000	3,700,000
1879	8,086,000	33,347,642	8,721,796	11,749,500
1880	13,160,909	21,832,478	27,863,649	30,561,150
1881	11,013,410	52,256,235	11,657,865	15,091,000
1882	4,475,000	17,159,611	3,112,825	4,885,250
1883	1,040,000	13,093,325	11,558,060	4,435,000
1884	9,300,764	57,018,151	15,924,645	25,182,250
1885	2,779,670	43,119,797	13,473,295	25,018,750
1886	3,195,300	22,749,824	4,302,806	8,253,000
1887	24,827,000	158,754,876	19,961,781	90,450,922
1888	34,765,000	166,827,752	83,642,400	49,848,840
1889	26,333,320	118,708,645	59,221,669	37,413,810
1890	2,689,300	146,078,320	44,515,167	
1894		117,569,783	12,112,415	
1895	29,547,919	155,625,800	55,064,938	55,670,204
1900	32,142,550	78,857,657	18,702,299	24,504,771
1905	4,475,000	17,199,000	8,262,000	4,655,000
1906	325,000	3,622,000	637,000	490,000
1907	6,701,000	7,358,000	4,232,000	1,300,000

Of the traffic on the lower portion of the upper river that alone requires special mention which is handled on the Illinois River, mostly between St. Louis and Peoria. The total traffic on this river was given by the census in 1906 as 207,828 tons, of which the largest single item was grain. Of the two canals of this section which feed into the Mississippi the Hennepin Canal, which enters the river by way of the Rock River near Rock Island, was opened to navigation late in 1907 and handled in that year 3,742 tons of freight and 2,862 passengers. The Illinois and Michigan Canal from Chicago to La Salle is now partly replaced by the Chicago Drainage Canal, but the remaining portions of the earlier waterway control its depth and its commerce. Traffic on the Illinois and Michigan Canal, which in 1889 amounted to 917,000 tons, was only 6,470 tons in 1906.

IV.

ST. LOUIS.

St. Louis, constituting one terminus of most of the steamboat lines, has shared the fate of these lines in its river business. To make this decline clear, it is only necessary to present from the records of the St. Louis Merchants' Exchange the following statistics, showing at intervals the receipts and shipments of St. Louis by the different rivers and the total receipts by rail. It gives, moreover, a striking picture of the decline of Mississippi River commerce as a whole.

Shipments and receipts of freight, in tons, at St. Louis, by rail and river, for specified years, 1871-1906,^a

[Compiled from St. Louis Merchants' Exchange reports.]

SHIPMENTS.

Year.	Upper Mississippi	Lower Mississippi	Illinois	Missouri	Ohio
1871.....	78,967	477,976	10,946	14,438	112,652
1875.....	96,225	367,235	18,470	25,100	121,025
1880.....	55,264	813,080	9,935	16,415	135,360
1885.....	48,295	442,850	865	10,330	17,130
1890.....	22,517	533,805	3,620	10,035	
1895.....	30,780	241,455	7,040	5,565	
1900.....	36,675	187,385	5,020	1,225	
1905.....	25,730	35,295	6,225	1,705	
1906.....	36,000	31,905	7,835	3,565	

RECEIPTS.

1871.....	236,887	313,211	116,000	72,579	101,673
1875.....	198,100	128,020	153,905	30,160	146,805
1880.....	226,005	223,925	155,605	59,025	214,195
1885.....	117,445	116,950	81,830	16,875	134,595
1890.....	128,900	222,055	22,770	21,350	102,500
1895.....	78,170	239,000	30,600	3,270	35,440
1900.....	50,070	274,415	20,905	2,725	2,700
1905.....	31,190	107,520	8,725	3,580	125,755
1906.....	31,140	106,670	11,550	2,485	160,120

SHIPMENTS.

Year.	Cumberland and Tennessee.	Red, White, Arkansas, and Onatchota.	Total by river	Total by rail	Grand total.
1871.....	2,534	42,995	770,498	659,882	1,791,380
1875.....	1,560	1,480	639,095	1,301,450	1,941,545
1880.....	1,315	6,160	1,037,525	2,755,680	3,793,205
1885.....	9,955	4,750	534,175	3,557,433	4,071,308
1890.....	15,675	6,180	601,862	3,220,850	3,872,712
1895.....	17,335	1,310	303,355	3,319,327	3,632,082
1900.....	15,275	-	245,380	9,480,304	9,725,880
1905.....	8,630	-	89,575	15,225,973	15,306,548
1906.....	6,880	-	89,185	17,672,006	17,761,191

RECEIPTS.

1871.....	9,875	4,476	881,401	4,268,324	5,152,722
1875.....	6,315	100	661,525	3,232,770	3,896,295
1880.....	15,015	-	893,860	6,096,524	6,990,384
1885.....	9,470	-	479,065	6,764,468	7,243,233
1890.....	31,175	132,900	685,730	9,969,291	10,631,021
1895.....	23,575	98,685	508,830	10,189,314	10,998,474
1900.....	87,825	73,330	512,010	15,375,441	15,887,451
1905.....	11,870	1,210	289,850	23,915,640	24,205,540
1906.....	10,935	1,770	327,670	27,292,617	27,629,287

^a These figures exclude lumber, logs, and shingles handled in rafts.

St. Louis suffered seriously in her upper-river commerce from the diversion eastward by the railways of traffic from the various river points. As early as 1875, 90 per cent of the lumber product floated on the upper Mississippi was diverted before it reached St. Louis, and in 1874 this proportion reached 94 per cent. In 1871 the receipts at St. Louis from the upper Mississippi were three times the shipments, but in 1906 they were about equal in amount and insignificant in

quantity. The loss in river receipts of lumber from the upper Mississippi has been partly compensated for by the receipts of southern pine brought in barges from the Tennessee and the lower Mississippi, but the amount handled by rail is now far in excess of that by water. Shipments of lumber to interior points of consumption are now almost entirely by rail.

In contrast to business by way of the upper Mississippi, the shipments to the lower Mississippi until 1895 exceeded the receipts. This is largely due to development of the barge lines to New Orleans, which will be later described. This barge traffic, which was largely in bulk grain, ceased in 1903. River grain receipts are now entirely in sacks, handled by packet steamboats from points up and down the Mississippi, including also the Illinois and the Missouri rivers. The total receipts by river in 1906 of wheat, corn, oats, barley, and rye were only 866,199 bushels. Almost no grain is now shipped from St. Louis by water. Of cotton receipts, less than 1 per cent in 1906 came by water. Commerce by way of the Illinois, Missouri, Cumberland, and Tennessee has declined to but a fraction of its former size, and that of the Red, White, Arkansas, and Ouachita rivers has disappeared altogether. The total receipts and shipments at St. Louis for 1906 of the first four rivers mentioned did not amount to 50,000 tons.

Shipments to the Ohio River ceased before 1890, but receipts from there still continue, amounting in 1906 to half the total river receipts. This was entirely coal from the Monongahela River. River commerce at St. Louis which in 1871 constituted 34 per cent of the total rail and river tonnage, aggregated in 1906 only nine-tenths of 1 per cent of the total traffic.

V.

MISSOURI RIVER COMMERCE.

Missouri River commerce reached its height previous to the civil war and much of the equipment was destroyed during that struggle. The discovery of gold in Montana in 1862 furnished a slight incentive to waterway travel, as the Missouri was the only possible means of reaching the gold fields. Such passenger traffic as was developed after the war consisted of gold seekers, pioneers, Indians, and United States troops. Some attempt was made to handle through freight traffic between St. Louis and the head of navigation at Fort Benton, 2,300 miles away. In 1867, for example, 71 steamers left St. Louis for Fort Benton and the upper Missouri, averaging 260 tons each and carrying a total of 16,655 tons. The average time consumed in the journey was about two weeks.^a

The river seems very early to have been divided for navigation purposes into three stretches—that from its mouth to Kansas City or Omaha; that from Sioux City, Iowa, to Bismarck, N. Dak.; and that from Bismarck to Fort Benton, Mont., or, in low water, to the mouth of the Yellowstone. The boats which could reach these upper waters were of small capacity. The traffic never developed significant proportions and the details are hardly worth reproduction.

^a Ex. Doc., 40th Cong., 3d sess., vol. 2.

It is sufficient to say that the downstream traffic in the most prosperous times, and in the best stages of water, consisted principally of ores and bullion, wool, hides, and skins, and the upstream traffic of supplies for the pioneers and military garrisons. In 1881 there were five lines of steamboats which made their headquarters at Bismarek, and 21 boats plied between that town and points on the Missouri, making in the season 150 to 175 trips. These boats carried into Montana 13,780 tons of private freight and 3,600 tons of government freight, besides 1,300 passengers, 2,100 Indians, 1,800 head of horses and cattle, and 600 head of sheep. The exports from the upper river so far as ascertained included 23,000 buffalo hides, 180 tons of wool, 253,750 tons of hides, and furs and wolf skins."

But the invasion of this territory by the railways practically put an end to what little commerce the river interests had developed. Railway rivalry dates from the close of the war, and soon after 1870, the Missouri River along its entire length was subject to the severest railway competition which any waterway in the country experienced. In 1906, above Sioux City, Iowa, only 10 boats were engaged in freight and passenger traffic, the freight carried including 9,540 tons of grain, 8,250 tons of live stock, 5,567 tons of lumber and wood, 11,780 tons of sand and building material, and 8,850 tons of general merchandise. A line of boats handling grain and general merchandise also operated from Bismarek to points on the Yellowstone River. This part of the river is mainly used to-day by gasoline barges carrying goods to and from railway crossings. From Sioux City to the mouth of the Missouri the principal traffic was sand and stone, with a small movement of lumber, grain, and general merchandise. In 1906 the total tonnage handled on the lower Missouri was only 573,348 tons.

The small part played by the Missouri River in internal-waterway commerce is due not alone to the intense and successful railway competition which has prevailed throughout its drainage area. It is due in part to the tortuous, treacherous, and frequently obstructed channel, upon which the expenditures of the Government, amounting up to June 30, 1907, to \$11,191,000, have had as yet little, if any, effect in the improvement of navigation. Capital, even if not fearful of railway competition, has little desire to engage with an unruly stream in a struggle of which the issue is so doubtful.

VI.

LOWER MISSISSIPPI COMMERCE.

One of the most interesting attempts to resuscitate the commerce of the lower Mississippi after the war is found in the organization of companies for the operation of barge lines between St. Louis and New Orleans. The invasion of river territory by the railways had, for reasons already noted, led to the abandonment of the old passenger packet steamboat in favor of towboats or propelling steamboats with tows of barges or flats which held the freight. This has already been shown in the description of the Ohio River coal trade. This method appeared again in the St. Louis barge lines, but with

^a Ex. Doc., 18th Cong., 1st sess., vol. 4.

this difference, that the barges were much larger and more expensively constructed, and that the propellers were built with a greater view to speed than was the case with the Ohio boats. It was intended that these lines should handle general merchandise as well as grain, and should deliver their products speedily and on schedule time at New Orleans.

The boats carried fuel for a round trip and no passengers except the crews. They made stops only long enough to pick up additional barges at points along the river, and in this way could avoid steamboat delays and make a high average speed.

The barges had a capacity of from 50,000 to 60,000 bushels of grain each, and could be loaded quickly from elevator spouts. A tow boat often left St. Louis with from 4 to 6 barges attached. At New Orleans stationary and floating elevators received the grain. The character of traffic other than grain handled by the barges is best illustrated by the description of a shipment from St. Louis in 1880 quoted by the St. Louis Republican. The contents of the barges were as follows:

- 4,371 barrels of flour.
- 1,296 barrels of meal.
- 1,090 barrels of grits.
- 5,258 sacks of corn.
- 802 sacks of oats.
- 650 sacks of bran.
- 1,296 packages of lard.
- 204 packages of meat.
- 150 bales of hay.
- 21,992 bushels of bulk corn.

This total was estimated as equivalent to 155 carloads of freight.

In 1875 there were only 4 tugboats and 30 barges employed between St. Louis and New Orleans, but in 1887 four barge lines were operating 16 tugboats and 120 barges. These barge lines were later consolidated into one corporation known as the "St. Louis and Mississippi Valley Transportation Company."

The most important traffic of the barge lines was that in bulk grain, and the commercial history of this commodity is worth a moment's attention. In the early part of the nineteenth century New Orleans had received large quantities of cereals by river for export to foreign ports and to Atlantic seaboard cities. This traffic fell off after the invasion of the primary grain markets by the railways, with the result that in 1873 New Orleans exported less than $2\frac{1}{2}$ per cent of the corn and less than one-half of 1 per cent of the wheat. Grain, particularly corn, still moved south for local consumption, but in increasing proportion by rail. The Select Committee on Transportation Routes to the Seaboard stated that the export of wheat from New Orleans in 1873 was 243,027 bushels out of a total export of 50,733,672 bushels, of which New York handled 21,221,254 bushels. Of corn 946,457 bushels were exported in 1873 from New Orleans out of a total from the United States of 38,541,930 bushels.

In the handling of grain out of St. Louis there appears very early to have been genuine competition between rail and water routes. The first shipment of grain from St. Louis east by rail took place in 1865, and from that date the railways extending to the Atlantic seaboard frequently engaged in rate wars, at one time transporting

grain from St. Louis to the seaboard at as low a rate as 9 cents per bushel. In 1878 a pool was formed embracing all the roads connecting the Atlantic seaboard with St. Louis and other competing western points. The railways, being bound to maintain their rates, could no longer meet the water rates. This, coming coincidentally with the completion of the jetties at the mouth of the river, gave such a stimulus to river commerce that almost the entire grain exports from St. Louis went to New Orleans. But this sudden burst of prosperity was short lived. The railways were at war again in 1881, and the river boats were unable to carry grain at war rates. For a time thereafter the grain traffic by river fluctuated with the condition of harvests, and with the signing or breaking of treaties of peace between the railways, but after 1896 it entered upon a decline, and in 1903 it ceased altogether. To the destruction of barge-line traffic not alone railway competition, but also a rapid depreciation of equipment and high marine insurance rates contributed. The following table, compiled by the Bureau of Corporations,^a shows the traffic in grain from 1870 to 1903.

*Shipments of bulk grain from St. Louis to New Orleans on Mississippi River boats
1870-1903.*

(Compiled from St. Louis Merchants' Exchange reports.)

Year	Wheat	Corn	Rye	Oats	Total
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
1870.....	66,000				66,000
1871.....		309,077		3,000	312,077
1872.....		1,711,039			1,711,039
1873.....		1,373,969			1,373,969
1874.....	365,252	1,017,791		10,000	1,423,046
1875.....	135,961	172,617			308,578
1876.....	37,141	1,737,237			1,774,379
1877.....	351,153	1,378,056	171,841		1,901,053
1878.....	1,876,639	2,857,056	609,011	108,867	5,471,663
1879.....	2,390,897	3,583,589	157,421	30,968	6,163,885
1880.....	5,913,272	9,801,392	15,000		15,762,064
1881.....	4,197,981	8,640,720	22,423	152,825	12,993,949
1882.....	5,637,391	2,529,712	15,991	150,320	8,333,417
1883.....	1,435,013	9,629,509	205,430	389,826	11,079,898
1884.....	1,318,688	4,193,783	314,864	487,221	6,647,558
1885.....	50,000	8,189,039	36,093	101,787	8,667,919
1886.....	713,439	7,391,730		398,755	8,813,924
1887.....	3,973,737	7,365,110		217,722	11,596,799
1888.....	4,217,952	5,844,012		160,581	10,252,545
1889.....	1,651,950	12,198,955	17,132	89,707	14,158,044
1890.....	1,409,430	8,717,849		81,960	10,217,249
1891.....	6,940,215	1,182,731	15,600		8,168,546
1892.....	5,149,708	3,228,645		36,787	8,414,900
1893.....	3,719,360	1,293,808		75,430	5,069,598
1894.....	1,912,193	1,263,310		10,000	3,345,503
1895.....	458,913	1,231,803			1,690,717
1896.....	1,742,561	8,368,087		436,558	10,547,208
1897.....	1,191,632	1,837,963	190,968	265,379	3,475,942
1898.....	2,717,991	3,006,188	212,720	633,505	6,600,707
1899.....	244,720	1,718,717		249,998	2,213,435
1900.....	169,211	2,371,870		273,049	2,614,130
1901.....	1,828,214	335,703			2,163,919
1902.....	2,308,711	29,700	28,212	28,409	2,596,732
1903.....	1,724,320	1,076,221			2,799,541

For the seventeen years from 1887 until 1903 the average published rates on grain from St. Louis to Liverpool by river to New Orleans were from 5 to 9 cents per bushel lower than those via rail to New York. If these published rates were the actual rates charged, it is evident that other considerations were sufficient to offset a con-

^a Transportation by Water in the United States, Part II.

siderable advantage in the transportation charge. The following table gives the comparative rates for this period:

Average published rates of freight St. Louis to Liverpool on wheat, in cents, per bushel, 1887-1903.^a

Year.	Via river and New Orleans.	Via rail and New York.	Year.	Via river and New Orleans.	Via rail and New York.
1887.....	15	24½	1896.....	13.50	19.67½
1888.....	15½	22.95	1897.....	12.89	20.33
1889.....	17½	24.97	1898.....	14.24	20.32
1890.....	14½	21.48	1899.....	12.33	17.88
1891.....	15½	23.55	1900.....	14.64	18.41
1892.....	14	21	1901.....	9.48	14.03
1893.....	14.71	21.72	1902.....	8.53	15.33
1894.....	11.69	18.71	1903.....	10.00	16.02
1895.....	12½	18.33			

^a Report St. Louis Merchants' Exchange, 1908.

Lack of railway facilities in the South before the war and the execrable condition of the roads led the planters to locate their cotton lands along the river banks, and transportation of cotton was almost wholly by water. Alabama planters sent their cotton by way of the Tennessee River to New Orleans, and such points as Memphis, Vicksburg, Natchez, and Shreveport became important collecting and shipping ports. In the decade 1850-1860 cotton was by far the most important product received by river at New Orleans.

With the development of railways in the South after 1865, the establishment of cotton-manufacturing plants at various points in the South, the extension of cotton culture westward beyond the Mississippi into territory not served by waterways, and the change in the methods of purchasing, compressing, and shipping cotton, the waterways became of decreasing importance. The immense cotton territory extending up the Mississippi and along the Red, Ouachita, Arkansas, and White rivers, which had sent its cotton to New Orleans wholly by water, began to ship its product by rail. By 1880 shipments of cotton from the Arkansas and the White rivers had practically ceased. The Red and the Ouachita still clung for a time to traffic which was too remote from a railway to be economically handled in that manner. But in 1881 a branch of the Texas and Pacific was completed which paralleled the Mississippi to Baton Rouge, and followed in general the direction of the Red River as far as Shreveport. This soon reduced the commerce of the Red River to insignificance.

In the early days Vicksburg was one of the most important commercial dependencies of New Orleans, shipping immense quantities of cotton and receiving supplies for distribution inland. But the Yazoo country was lost to the river when the Yazoo and Mississippi Railroad, running through the Mississippi delta region, was opened in 1884. In 1899 this railway carried 483,000 bales of cotton or 10 per cent more than all the rivers combined. The Natchez, Jackson and Columbus Railroad was completed in 1882. Natchez, formerly the most important river town between New Orleans and Louisville, was soon thereafter without any regular packet line from New Orleans. By 1887 three-fourths of the cotton of Natchez and Vicksburg was being handled by rail. Northeastern Mississippi,

northern Georgia, western Tennessee and Kentucky in this period began sending their cotton by rail to Savannah, Charleston, and Norfolk. Memphis, although still receiving a considerable quantity of cotton by river, 25,392 tons in 1906, sends out most of it by railway.

New Orleans has been compensated for her river losses by rail receipts from Texas plantations, so that the total cotton receipts at New Orleans have steadily increased. The following table shows the receipts of cotton at New Orleans for a series of years, and the percentage received by river:

Receipts of cotton at New Orleans a

Year.	Receipts by rail.	Receipts by river.	Percentage by river.
	<i>Bales.</i>	<i>Bales.</i>	
1873.....	438,495	968,877	68.8
1875.....	406,076	750,080	64.8
1880.....	627,577	1,087,522	63.5
1885.....	1,018,261	680,376	40.0
1890.....	1,722,173	325,828	19.8
1899.....	1,965,177	343,450	15.0
1904.....	1,833,755	192,812	9.5
1907.....	2,082,053	231,581	10.0

a Reports New Orleans Cotton Exchange.

The decline in grain and cotton traffic on the lower Mississippi is typical of the movement on this section of the river. By 1887 there was not, with the exception of Bayou Sara, a town on the lower Mississippi of over 1,000 population which was without railway connection with New Orleans, St. Louis, or Memphis. To the boating interests was left undisturbed only the local commerce between the river villages. Evansville, Paducah, and Wheeling had no longer direct lines of steamers to New Orleans. The Cincinnati trade had been reduced to one-quarter of its former size, and one line of through steamers was sufficient to care for the Cincinnati and Louisville trade with New Orleans. The latter city had almost entirely lost its earlier trade in "western products," as the following table shows:

Western produce exported from New Orleans, for the years 1856 and 1886.

Article	Year ending June 30	
	1856	1886
Wheat flour.....	barrels 951,701	29,832
Beef.....	pounds 1,477,700	126,546
Bacon and hams.....	do 3,836,150	149,481
Pork.....	do 4,675,900	801,588
Lard.....	do 20,000,000	347,196
Spirits, distilled.....	gallons 25,833	1,540

a Report on Internal Commerce of the United States, 1886.

Since 1887 the situation has not improved and to-day the river from St. Louis south, aside from the transportation of cotton on its lower stretches, and the receipt and conveyance of coal from the Ohio, is a negligible transportation factor.

There are no longer any through passenger or packet boats from St. Louis to New Orleans. All through freights (except on barges) must usually be transferred from packet to packet at Memphis and Vicksburg. Occasionally a few passenger boats make the through trip upstream or down for the benefit of excursionists, but only a few times a year.^a Between St. Louis and Cairo there is nothing but local traffic between river towns. The total tonnage handled in 1906 amounted to 458,000 tons, of which the largest items were coal 171,000 tons and logs 120,000 tons. Cairo was formerly an important river shipping point for grain, but the railways destroyed the water traffic by low rates, and by granting certain transit privileges and establishing switch connections. It is a typical instance of the struggle of efficiency against inefficiency, which will be referred to again in the conclusion to this discussion.

Between Cairo and Memphis the through business is controlled by railways on both sides of the river and, except for coal southward and lumber northward, the traffic is insignificant and local. One packet line only operates between Memphis and St. Louis and Cincinnati. Between Memphis and Vicksburg there is a considerable traffic in logs and lumber brought down from the tributaries. Southward the logs are propelled in rafts, but northward they are handled, like lumber, in barges. The season is a long one, usually about nine months, and the radius of movement is 250 to 300 miles from Memphis. In 1906 about three-quarters of a million tons were handled.

Cotton begins to appear in the river statistics from Memphis southward. Iron and steel products to some extent come down the river to Memphis from the Pittsburg district. From Memphis southward are shipped general merchandise and plantation supplies; return shipments, which are considerable, consist of cotton and cotton seed. Commerce on the White River in 1907 amounted to 128,000 tons, most of which was logs, ties, and lumber. On the Arkansas in 1907 the total tonnage was 105,000 tons, largely logs and lumber.

Between Vicksburg and New Orleans the local traffic is greater, and miscellaneous merchandise plays a larger part. Only a few local lines remain in operation from Vicksburg south, as this stretch of the river is under almost complete railway dominance. Yazoo River commerce amounted in 1907 to 228,000 tons, the largest items being lumber and logs. The Red River still ships some cotton, lumber, and plantation supplies, the extent of the traffic varying with the condition of navigation, and cotton and lumber still come from the Ouachita. Of the total commerce on the Mississippi proper between Vicksburg and New Orleans, amounting in 1906 to 2,554,000 tons, 832,000 tons, or 33 per cent, consisted of coal from the Ohio, and 859,000 tons, or 34 per cent, of gravel, sand, and stone.

The commerce of the river port of New Orleans has been discussed already in connection with the coal, grain, and cotton trade. Aside from these products, and the lumber and logs received from the Mississippi tributaries, there is some traffic in rough rice, in petroleum, and in miscellaneous merchandise. The total river commerce of New Orleans is estimated by the Bureau of Corporations to be over 1,800,000 tons. If this figure be compared with a total in 1880 of

^a H. Doc. No. 50, 61st Cong., 1st sess.

2,959,250 tons, not including rafts, it will be seen that there has been a heavy falling off in river commerce at this port.

Neither has this port been able, even with the aid which railways have afforded in later decades, to maintain its position as an exporting and importing point. In 1860, 27 per cent of the total exports from the United States went by way of New Orleans and 6.3 per cent of the imports were received through this port. In 1886 the percentage of exports was 12 per cent and of imports 1.1 per cent; in 1907 the percentage of exports was 9.07 per cent and of imports 3.21 per cent. However, other causes, beyond the scope of the present discussion, have affected the position of New Orleans as a commercial port.

The present condition of traffic on the lower Mississippi may be clearly shown by the reproduction of a table presented in a recent report of a board of United States engineers.^a

^a H. Doc. No. 50, 61st Cong., 1st sess.

Tonnage and traffic of the Mississippi River, St. Louis, Mo., to New Orleans, La., year 1907. a

Total number of passengers received and discharged.		Grain and its products.	Cotton.	Cotton seed.	Live stock.	Coal and coke.	Lumber.	Logs.	Iron, steel, and metals.	Groceries and provisions.	Oil.	Stone, gravel, and sand.	Unclassified and miscellaneous.
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
DOWNSTREAM.													
Received at St. Louis.	21,251	2,782			319	10	226	375	709	3,485	83	1,000	34,863
Received between St. Louis and New Orleans.	2,981	10,392			574		78	19,800					3,238
Discharged between St. Louis and New Orleans.	12,387	1,576			540		214	6,000	444	2,730	78	1,000	17,250
Received at New Orleans.	3,643	11,398			155	10	90	11,175	265	755	5		4,301
Received at New Orleans.	1,321					1,067,151			27,938			14,200	11,889
Received at New Orleans.	8,756	1,000	10,337	8,301		4,000	8,292	170,980				1,000	5,702
Discharged between New Orleans and New Orleans.	3,576	1,000		1,102		28,950		37,000	676			1,000	16,730
Received at New Orleans.	17,080		10,337	6,590		205,825	8,292	1,33,980	9,290			1,000	15,317
Received at New Orleans.	39,408	13,094	40	2,196		24,070	1,952		2,774	12,273	364	10,000	21,510
Received at New Orleans.	28,228	3,594	11,811	8,524	2,173	10,520	573	218,000	358	2,940	108	878,294	4,123
Discharged between Memphis and New Orleans.	55,814	16,688	5,171	1,774	4,301	35,129	2,525	153,000	3,374	11,909	525	791,154	25,124
Received at New Orleans.	8,647		1,795	4,050	18	24,340		65,000	4,754	304	7	100,000	27,279
Received at New Orleans.	7,987	410	483		520		732			3,124	19		9,157
Received between Vicksburg and New Orleans.	11,731	19,254	29,502	26,458	762	52,200	21,712	167,007	450	43,510	101,497	138,351	96,952
Discharged between Vicksburg and New Orleans.	16,251	770	1,407	2,170	1,130	116,200	1,119	87,007	500	15,200	70,025	3,200	21,824
Discharged at New Orleans.	3,612	18,891	33,123	27,038	202	747,500	21,325	80,000	12,926	31,374	31,488	144,951	86,579
UPSTREAM.													
Received at New Orleans.	5,707	6,989			402	300	8,432		2,125	27,191	86,749		15,802
Received between New Orleans and New Orleans.	16,645	79	3,370	43,034	600	200	13,302	19,800	200	500	29,497		14,894
Discharged between New Orleans and New Orleans.	13,400	7,008	2,489	11,206	1,002	500	724	5,000	2,325	22,032	112,136		30,473
Discharged at Vicksburg.	8,192		881	31,828									100
Received at Vicksburg.	8,298	3,946	54		102	50	1,840		323	4,372	42		3,363
Received between Vicksburg and Memphis.	48,061	1,303	25,913	15,032	3,125	15	121,012	145,895	367	2,422	47		9,174
Discharged between Vicksburg and Memphis.	32,963	5,209	9,409	7,288	1,955	65	337	20,200	572	9,715	89		7,928

Discharged at Memphis.....	23,366	40	16,558	8,344	1,272	15,933	79,795	118	201	3,610	4,732
Received at Memphis.....	22,626		534				1,800				13,013
Discharged between Memphis and Cairo.	3,450	3,193	1,037	1,075		35,589	218,889				36,342
Discharged at Cairo.....	13,643		19	98			11,000				5,748
Received at Cairo.....	4,138	3,193	572	977		161,718	231,389		2,517		38,437
Discharged between Cairo and St. Louis.	3,913	75	542	260	268	166,350	23,156		195		2,533
Received at St. Louis.....	8,138	8,161			10,114	257		30	700	4	9,149
Discharged between Cairo and St. Louis.	1,485	442			28			30	25		975
Discharged at St. Louis.....	18,891	7,794	1,522	260	10,354	166,350	39,000	30	870	4	15,877

a H. Doc. No. 50, 61st Cong., 1st sess.

SUMMARY.

It is difficult to summarize statistically the present traffic condition of the Mississippi River system. The reports of the corps of United States Engineers cover specific sections of the river, and are published as made, with no attempt to unify them and eliminate duplications. The Census Report on Transportation by Water in 1906 excluded all logs and lumber in rafts, and confined its statistics to the traffic transported by some form of vessel. Inasmuch as rafting has always been one of the chief sources of reliance for interior river commerce, this leaves the total figures incomplete at a vital point. The total receipts and shipments on the entire system for vessels of over 5 tons, including harbor traffic and car ferries, amounted in 1906 to 31,626,981 net tons. To this should be added, according to the report of Bureau of Corporations, at least 6,000,000 tons of logs and rafts. Of the total freight movement, exclusive of harbor traffic and car ferries, amounting to 19,531,093 tons, more than 56 per cent was coal, and 20 per cent stone and sand. This was an increase in coal traffic since 1889 of 29.4 per cent, and in stone and sand of 1,147 per cent. Lumber and logs in rafts not being included, it is impossible to determine exactly their movement during these fifteen years, but the decline has probably been fully 25 per cent. The movement of grain, cotton, and iron ore has fallen to insignificant amounts.

A characteristic feature of river transportation, which has been growing steadily more pronounced since 1865, is the predominance of the unrigged craft over the packet steamboat. In 1906, out of a total of 9,622 vessels on the river system, 8,187, or 85 per cent, were unrigged, and of the steam vessels only 390 were employed for the carrying of freight and passengers in regular river service. The remainder were tugs and towing vessels, ferryboats and yachts. By these unrigged craft most of the traffic was transported, the largest part of the commerce being in Ohio River coal. Out of a total of 19,531,093 tons carried, 13,980,368 tons, or 71 per cent, were transported on the Ohio in barges and flats. Aside from bulk traffic in barges, flats, and rafts, the business on the river is almost wholly local and for short distances.

This decline has been the subject of much comment, particularly by those who have observed the extended use to which waterways have been put in many of the European countries. Yet the causes are not far to seek. It should be remarked, however, that they are so interwoven one with the other that it will be somewhat difficult to discuss them separately without apparent exaggeration of the importance of the particular cause as it is considered.

The first cause which suggests itself is that of the influence of competitive agencies, beginning with the eastward movement by lake and canal early in the thirties, and followed by the rail movement in the next two decades. This latter agency was undoubtedly more efficient from the very beginning, because of its greater power to adapt itself to varied traffic requirements. It is flexible in matters of speed, extensibility, terminal adaptability, and the like, and it is, moreover, much more reliable. Consequently, it drew away at once

all passenger travel, except excursion business and local or ferry traffic, and all mail, express, and fast-freight business, which deprived the steamboats of their most lucrative sources of earnings, being greatly aided in this endeavor by the interruption to water transportation during the war. But not only was the railway naturally more efficient, but it grew more efficient, relatively, as the years went on, for the steamboat business stood still or declined after 1860, except in its handling of a few products by barge.

Whether it is true or not, as frequently charged, that railways have secured control of steamboat lines, have purposely kept them inefficient, and have operated them to keep efficient service off the rivers, it is undoubtedly true that they have, as earlier noted, reduced rates at water competitive points and recouped themselves elsewhere. In this practice, supported as they are by judicial decree, they have a monopolized advantage from which competing steamboat lines are excluded.

The question whether the rivers any longer exert an influence upon rail rates has been frequently debated, emphatic assertions by the railways that such influence is still potent being met by equally emphatic statements that the river in its present condition is powerless to affect the rail rate. In the preliminary report of the Inland Waterways Commission are included elaborate comparisons of rail and water rates to various points for different classes and kinds of commodities. It would appear from a careful study of the tables bearing upon the Mississippi River situation that the waterway, inefficient as it is, exerts an influence to-day upon the rail rate varying in degree according to circumstances. This is made clear by a comparison of rates charged by railways paralleling the Mississippi north of St. Louis, where water traffic still prevails, with rates charged for similar distances by railways paralleling the Missouri, which is no longer a commercial factor. Rates on this stretch of the Mississippi are lower for the same commodity and distance. Yet when the cost of marine insurance is added to the river rate, and also the drayage charges which so frequently accompany the consignment and receipt of river traffic, it is a question whether railways could not, if they saw fit, absorb most of the water traffic, provided their equipment was adequate.

The table given below includes typical rates drawn from an exhibit presented in a recent special report of a board of United States engineers. It shows in parallel columns the rail and water rates on sections of the lower Mississippi. It will be observed that in some cases the rail rates are lower than the water rates, in some cases materially higher, and in some cases the rates are identical. Notwithstanding these variations, however, most of the traffic seeks the railway. One further fact should be noted. The distance between terminal points is in every case materially shorter by rail. This is an advantage which the railway almost invariably enjoys.

Freight rates per ton by rail and water, December, 1908.^a

Terminal points.	Mileage distance.		Sand and gravel.		Manufactured iron.		Grains and seeds.		Cotton.		Sugar and molasses.		Iron ore.	
	Water.	Rail.	Water.	Rail.	Water.	Rail.	Water.	Rail.	Water.	Rail.	Water.	Rail.	Water.	Rail.
From St. Louis to—														
St. Paul.....	729	576	\$2.00	\$1.70	\$2.80	\$4.20	\$2.80	\$3.00	\$8.00	\$5.20	\$3.40	\$3.20	\$2.00	\$3.00
Cairo.....	182	150	.....	.75	2.00	3.10	3.00	.....	.....	.....	2.00	2.72	.....	1.68
Memphis.....	420	311	.....	1.60	3.00	2.60	5.00	2.40	3.00	2.20	2.50	6.00	.....	3.00
From New Orleans to—														
Vicksburg....	366	227	2.50	1.60	.....	3.40	2.40	2.40	4.00	.....	2.00	2.00	.....	3.40
Natchez.....	284	214	.....	1.60	.....	2.40	2.40	2.40	4.00	.....	2.00	2.00	.....	3.40
Baton Rouge	132	89	.30	1.40	.....	2.40	2.00	1.60	3.00	3.00	2.00	1.50	.....	1.40

^a H. Doc. 50, 61st Cong., 1st sess.

The lack of development of river equipment, already referred to, has been based in large part upon legitimate grounds—an unwillingness to invest capital in an industry so highly speculative. The risks are not alone those of railway origin, but they arise in part from the natural difficulties of navigation. Obstructions due to snags and bars on all the rivers except the Missouri have to a considerable extent been removed, although they are constantly liable to reappear. The barrier at the mouth of the Mississippi, which until 1878 gave the railways a decided advantage, is now gone. But there still remain many obstacles. Ice stops navigation for many months of each year in the upper river. The swiftness of the current demands a costly adjustment of business methods to meet the requirements of upstream traffic—a difficulty absent in the Lakes. The shifting and irregular current and the uncertainty of the water supply menace navigation. To such an extent is this true on the upper Mississippi that the one line now operating between St. Louis and St. Paul declines to make season contracts, and accepts shipments for single trips only. Then there are the variations in depth of water, most strikingly shown on the upper Ohio with the January and February floods, when the river sometimes rises at Cincinnati to 70 feet above low-water mark. This variation in water depth is not alone dangerous to navigation, but it prevents the application of capital to the greatest economic advantage. On the Lakes, with an assured depth of water, the largest vessels can be employed and loaded to their capacity. It is not profitable to build vessels on the rivers which can run only in the best stages, and which must lie idle during the rest of the year. But light-draft vessels are not economical in good stages of water. Moreover, these sharp and sudden variations in the stage of water have made fixed wharves impossible and have compelled the use of the less efficient floating dock. In low stages the cost of loading and unloading is sensibly increased in many places by reason of the steep and high river banks.

But navigation is hindered not alone by variations in stage of water due to floods and droughts, but also by the normal difference in depth of the different sections of the river system. The lack of development in the past of any through traffic from the upper Mississippi to New Orleans, and the persistence of the costly practice of transfer at St.

Louis, have been due to this difference in depth of the lower and upper river, and to the consequent difference in draft of vessel employed. It was to meet this difficulty that the barge system was introduced, whose units, similar to railway cars, could be dropped or attached at will, and handled on different stretches of river without the necessity of transfer of load.

Although it must be admitted that from a navigation standpoint the condition of the Mississippi is much superior to what it was in the days of its commercial prosperity, yet much remains to be done and much which is once done has to be frequently repeated. The destruction of banks due to shifting channels, and the fact that the Missouri uses the lower Mississippi as a dumping ground, make continuous dredging necessary, and any lessening of vigilance in this direction through failure of congressional appropriations is promptly punished by a serious impairment of the navigability of the stream. Yet however serious navigation difficulties may appear to us, they can not, except to a small degree, explain the decline of river commerce. For in spite of all obstructions, we possess free waterways which are in many respects superior to those of Europe; yet we have but a fraction of their tonnage. A dead low-water channel of 4½ feet prevails throughout the year from St. Paul to the mouth of the Missouri. Four feet draft prevails on the Missouri at low water as far as Kansas City. From St. Louis to Cairo there are only a few days in the year when a boat drawing 8 feet can not operate freely. Below Cairo for 840 miles there is a 9-foot depth during low water, and for the last 270 miles boats of 25 to 30 feet draft can operate. On the Ohio from Cairo to Pittsburg, there is a 9-foot depth during medium stages of water, which is being improved to a 9-foot depth at low water. In comparison with these figures it should be noted that much of the canal and upriver boat traffic of Europe is performed on 1 meter (3.28 feet) draft; most of it is done on 2 meters (6.56 feet) draft and 10 feet draft is exceptional.^a Hence it is lack of uniformity in different sections of the river, and a resulting inability to use equipment to the best advantage, rather than the shallowness of the streams which must be accounted the important navigation obstacle.

In the third place, whether, as a result of the two causes just mentioned, railway competition and navigation obstacles, or whether, because of a lack of initiative on the part of river interests after the war, the steamboat business has been wholly lacking in the administrative organization necessary to cope with so superbly organized an industry as the railway. Capital has kept out of it. The river steamboat, except that it has changed from a passenger to a freight carrier, is the same craft as always. As late as 1906, out of a total of 1,435 steam vessels on the Mississippi River system, 1,358, or 95 per cent, were of wood. The old inefficient "roustabout" labor is still employed, and no attempt whatever has been made to introduce mechanical appliances for loading and unloading. There are very few satisfactory wharves and docks, many of the landings being made on the river bank, and the goods dumped on shore without cover. As the rivers are at the lowest levels, goods must be hauled uphill to reach a place of sale. Good natural landings are few, and artificial

^a H. Doc. 50, p. 329, 61st Cong., 1st sess.

ones are too expensive to be within the reach of small communities. Thus the terminal expenses as compared with the more flexible railway are very heavy.

Adequate terminal facilities are in very few instances owned or controlled by water lines.

St. Louis, Mo., has little wharfrage, either public or private, except the graded river bank; East St. Louis has almost no public landings and few private ones; Cairo Ill., has several piers and slips and some few floating boat landings and warehouses, but all under private monopoly. Memphis and Vicksburg have limited public landings, consisting merely of graded banks and occasional floating warehouses. The other cities are less well provided. Such transfer facilities as exist at the Lake Superior and Lake Erie grain, ore, and coal harbors are unknown on the Mississippi. The injury to freights and cost of transfer by reason of necessary rehandling at the water's edge, and subsequent cartage up the bank and across the city to the consignee, are usually sufficient to outbalance a decided higher freight rate by rail.^a

In many cases all satisfactory terminal property has been acquired by the railways. For example, portions of the river front at Pittsburg, New Orleans, St. Louis, and Vicksburg are owned by railway corporations. The primary purpose of the railways is not to check the development of water transportation, but to secure desirable land for switch tracks and yards, yet its effect upon the development of steamboat traffic is disastrous.

Furthermore, nearly half of the steam vessels operated on the Mississippi, representing, however, only about one-quarter of the tonnage, are owned by individuals, and are run independently with very little thought of securing united action toward better organization of river traffic. This makes it impossible for shippers to arrange for through handling of goods. Repeated rehandlings by irresponsible steamboat captains cause damage to the goods, and make location of responsibility for the damage difficult and the settlement slow and costly. Practically the only traffic which is well organized is that of coal on the Ohio, and this is largely under the control of a single corporation. Of the total tonnage in 1906 of unrigged vessels, 96.6 per cent was owned by corporations.

Finally there was and still is a fundamental cause of decline of river commerce to be found in the relation of traffic movement to traffic agencies. So long as wheat and corn were produced near the waterways and could be disposed of at markets located on the rivers, traffic by river continued; but so soon as either of these conditions was no longer present, the railway began to take the business. If grain was shipped from a river port and required transfer to rail for delivery at a primary market, like Chicago, the expense of transfer and the lack of all facilities for satisfactory handling turned the traffic at its source to the railways. When grain began to be produced away from the waterways, it had to be loaded at first into railway cars, and once in the cars it remained there until it reached its market. The movement of the wheat area northwestward to a region west of Lake Superior and the advance of the corn area westward enhanced this tendency, and the railways encouraged it both by the provision of suitable facilities for storage and handling and by the adjustment of their rates. The effect upon the Mississippi River is strikingly shown by the fact that although in the fifties there were many towns with prospects of rapid and successful development, yet at the census of

^a H. Doe, 50, 61st Cong., 1st sess.

1900 there was not a river town from St. Paul to St. Louis with 40,000 people and only three, Quincy, Davenport, and Dubuque, with over 25,000 inhabitants. The same principle may be illustrated in other parts of the system. For example, Madison and New Albany, Ind., both declined in population between 1890 and 1900, and neither of them had 25,000 people in the latter year, whereas Indianapolis, pre-eminently a railway center, which in 1840 had less population than either of the towns mentioned and in 1850 almost exactly the same number, had in 1900 a population of 169,000.

So far as export business by way of New Orleans is concerned, the long roundabout journey, combined with lack of satisfactory steamship facilities at New Orleans, has had its influence in turning traffic eastward by rail.

The kind of business which has most satisfactorily developed on the Mississippi River system has been that transported in the form of rafts, the lumber business, and that handled by barges, of which coal is the best example. The former flourished on the upper Mississippi, and is still prosperous on the lower Mississippi and the Ohio and tributaries, because, as already indicated, it can be slipped into the water and carried to its market with little expenditure of labor and with no necessity of transfer. So soon as the forests were cut off on the banks of upper Mississippi tributaries, rafting began to decline, and a rapidly increasing proportion of lumber and log output was carried by rail.

The Ohio River coal traffic illustrates peculiarly well the kind and method of business to which the river system is at present adapted. In this industry, to be sure, are some of the advantages which are lacking in any other, namely, administrative organization, mechanical loading appliances, and the highest development of barge traffic. But in addition to all this, coal can be loaded direct from the mines into the barges and can then be transported without any rehandling to its destination, which is the river steamboat, the ocean-going steamship, the sugar plantation on the bay, or the railway coal yard on the river bank. In other words, the Mississippi can at present handle traffic successfully which begins and ends within its banks, but traffic requiring transfer to the railway at any point on its course will have a tendency to resort to the railway for the entire distance. Whether this situation is due to a control of terminal and transfer facilities by the railways and a refusal to pro rate with the waterway, whether it is due to lack of initiative on the part of river interests in developing transfer facilities, or whether it is due to the greater cheapness of an all-rail haul, the fact remains that carriage involving transfer no longer makes use of the Mississippi River system.

A recent special report of a board of United States engineers^a calls attention, in explaining the insignificant commerce of the lower Mississippi, to the fact that the population in sections bordering the river is as low as 86 to 24 per square mile, including cities, and that in a total length of about 1,265 miles there are only seven towns or cities of over 10,000 population and only 23 of over 5,000 population. In reply to this and in answer to the statements which picture the declining condition of river commerce the advocates of waterways insist that if they were given an improved channel commen-

^a H. Doc. No. 50, 61st Cong., 1st sess.

surate with the needs of business, traffic would come and the thinly settled sections along the rivers would be built up. They also contend that even if commerce were not developed by the waterway the existence of a waterway ready for use would so affect railway rates as amply to justify the expenditure for construction. This last contention may be dismissed with a few words. No expenditure by the National Government would be justified for the construction or improvement of a useless or idle waterway unless the saving could be clearly demonstrated in advance. Such a demonstration would, in the nature of things, be quite impossible, for it is evident that the comparative attractiveness of rail and water routes is not a simple question of comparative rates. A variety of factors which can be summed up in the word "serviceability" actually determine the method of shipment, and such factors can not be predetermined. If the purpose is to reduce railway rates, there are more direct and less costly methods of accomplishing this result.

The influence of a waterway in developing traffic is somewhat problematical, and no final answer can be given to the claims of those who insist that trade will follow the lock and the dam. Although there are real obstacles at present to successful navigation, as already noted, nevertheless it is difficult to understand why the commercial interests, if they are so eager for a waterway, have not made better use of existing facilities. The inference is a natural one that the trouble lies elsewhere than in the condition of water navigation.

But it must be admitted that there is some basis for the contention that good traffic facilities develop traffic. The truth of this has been often demonstrated by the railways. The waterway advocates have reason to count upon a repetition at least in part of railway experience, but hardly to the extent claimed by some of the extremists among the supporters of the policy. They have, however, the right to a reasonable assurance that such improvement work as is now being carried on and such plans as have been undertaken for further betterment shall be continuous, in order that such investments as they may make in floating equipment shall not be lost by an abandonment of improvement work.

To four general influences, then, may be assigned the decline in Mississippi River commerce: First, competition of rail and lake; second, natural obstructions to navigation; third, lack of administrative organization of the water transportation business; and fourth, certain fundamental principles of traffic movement which under existing conditions work to the disadvantage of water carriage.





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